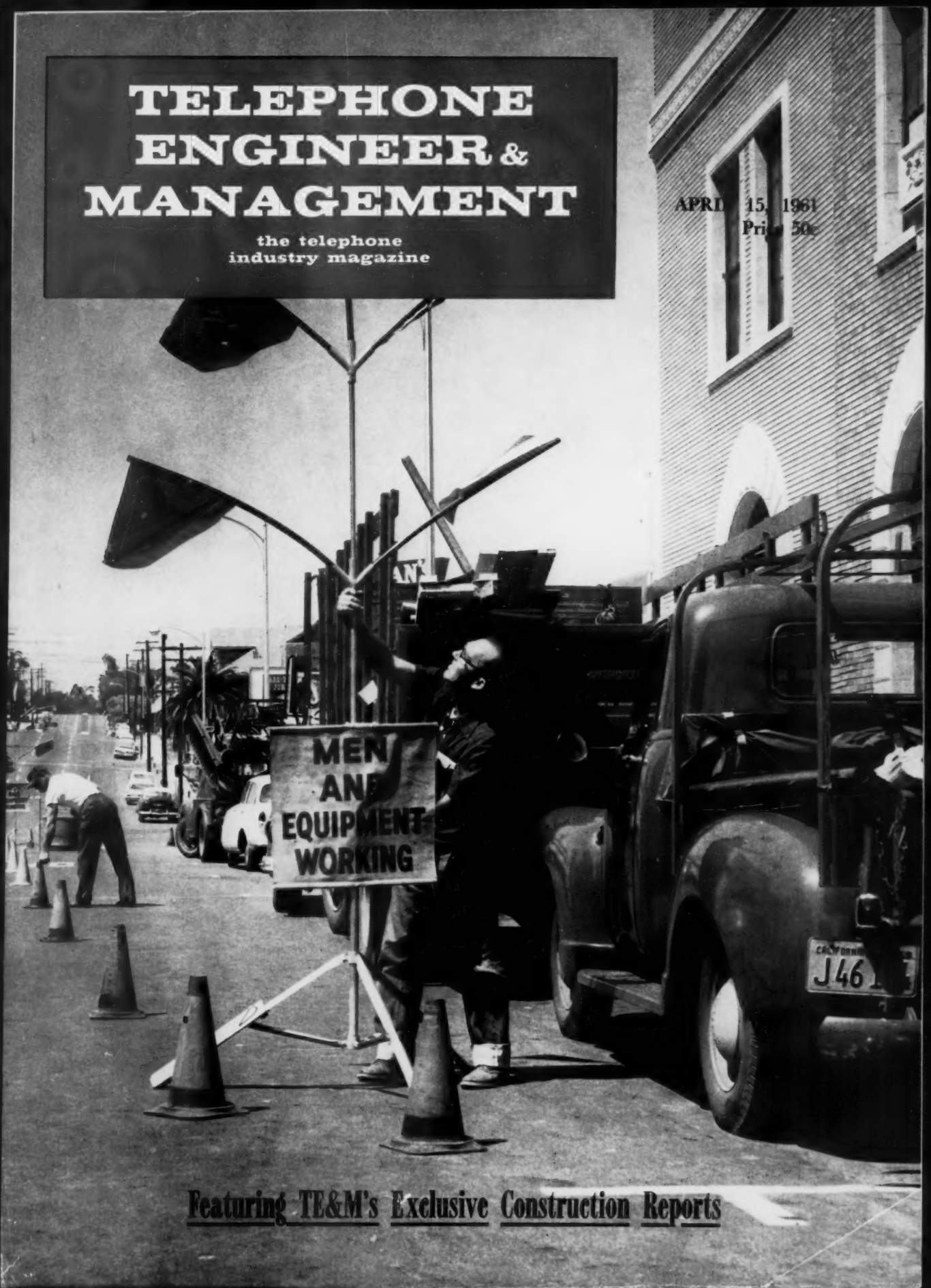
TELEPHONE ENGINEER & MANAGEMENT

the telephone industry magazine

APRIL 15, 1961
Price 50¢



Featuring TE&M's Exclusive Construction Reports

IT CAN BE DONE!

Good Public Relations Can Be Consistent With High Directory Revenues

A Berry directory salesman is well versed in the art of public relations. He knows that service is the basis for confidence, and confidence is the foundation on which sound sales are built. The business customer sees the Berry salesman as a friendly, reliable representative of the telephone company, who is genuinely interested in helping his business prosper through Yellow Pages advertising. With customer relations foremost in mind, L. M. Berry and Company contributes to the favorable public image of the telephone companies it serves, at the same time increasing directory revenues and profits. Let us show you how It Can Be Done!

for more information, call or write....

L. M. BERRY AND COMPANY

Telephone Directory Advertising Exclusively

YELLOW PAGES by BERRY

HULMAN BUILDING · DAYTON 2, OHIO · BALDWIN 4-7421

TELEPHONE ENGINEER & MANAGEMENT

Published on the 1st and 15th of each month by

TELEPHONE ENGINEER PUBLISHING CORP.
7720 Sheridan Road, Chicago 26, Ill.

Telephone
ROgers Park 4-3040
Chicago

EDITORIAL STAFF

ROY F. SMITH
Publisher

JOHN G. REYNOLDS
Editor

DICK REYNOLDS
Production Mgr.

PAT CULLINAN
Editorial Assistant

JOHN S. REED
Technical Editor

ROLAND DAVIES & FRED HENCK
Washington Editors

Contributing Editors
BILL CORMAN
C. D. EHINGER
L. A. GRITTEN
G. M. JONES
D. A. PERIGO
LEO SANDS
ALLAN R. STACEY

ADVERTISING STAFF

DONALD C. SORENSEN
Advertising Manager

RAY GERACI
Promotion Manager

BETSY MEYERS
Advertising Assistant

KEITH H. EVANS & ASSOCIATES
3723 Wilshire Blvd.
Los Angeles 5, Calif.
Tel. — DUnkirk 8-2981
515 Market St., Rm. 225,
San Francisco 5, Calif.
Tel. — YUkon 2-4280

BUSINESS STAFF

ROY F. SMITH
President

DONALD C. SORENSEN
Executive Vice President

JOHN G. REYNOLDS
Vice President

BETTY SCHROEDER
Corporate Secretary

ALICE PURDUE
Circulation Manager

BPA

Member of
Business Publications
Audit of Circulation, Inc.

Average Total Qualified Circulation
For 12-Month Period Ending June 1960,
13,817

TELEPHONE ENGINEER & MANAGEMENT

the telephone industry magazine

VOL. 65 NO. 8 APRIL 15, 1961

CONTENTS

ASSOCIATIONS
Coming Conventions 8

BOOKS
New Reference Books 47, 60

COMMENTARIES
Industry Observations L. A. Gritten 16
The Back of The Book John G. Reynolds 122

COMMUNICATIONS
Keeping Up With Communications 24
TE&M's Report On Space Communications (Part II) Fred Henck & Tom Malia 61

CONSTRUCTION
Getting The Most From Your Construction Dollars John S. Reed 31

MAINTENANCE
Maintenance Procedures That Eliminate Trouble Reports Richard Allen 36
Include All Departments In Your Plans C. D. Ehinger 57
Telephone Industry Newsletter 11

NEWS, TELEPHONE INDUSTRY
Washington Observations Roland Davies & Fred Henck 29
Telephone Industry News Highlights 82

PRODUCTS AND SERVICES
New Products' Showcase Dick Reynolds 75
Telephone Market Place (Classified Advertising) 111
Advertiser's Index 121

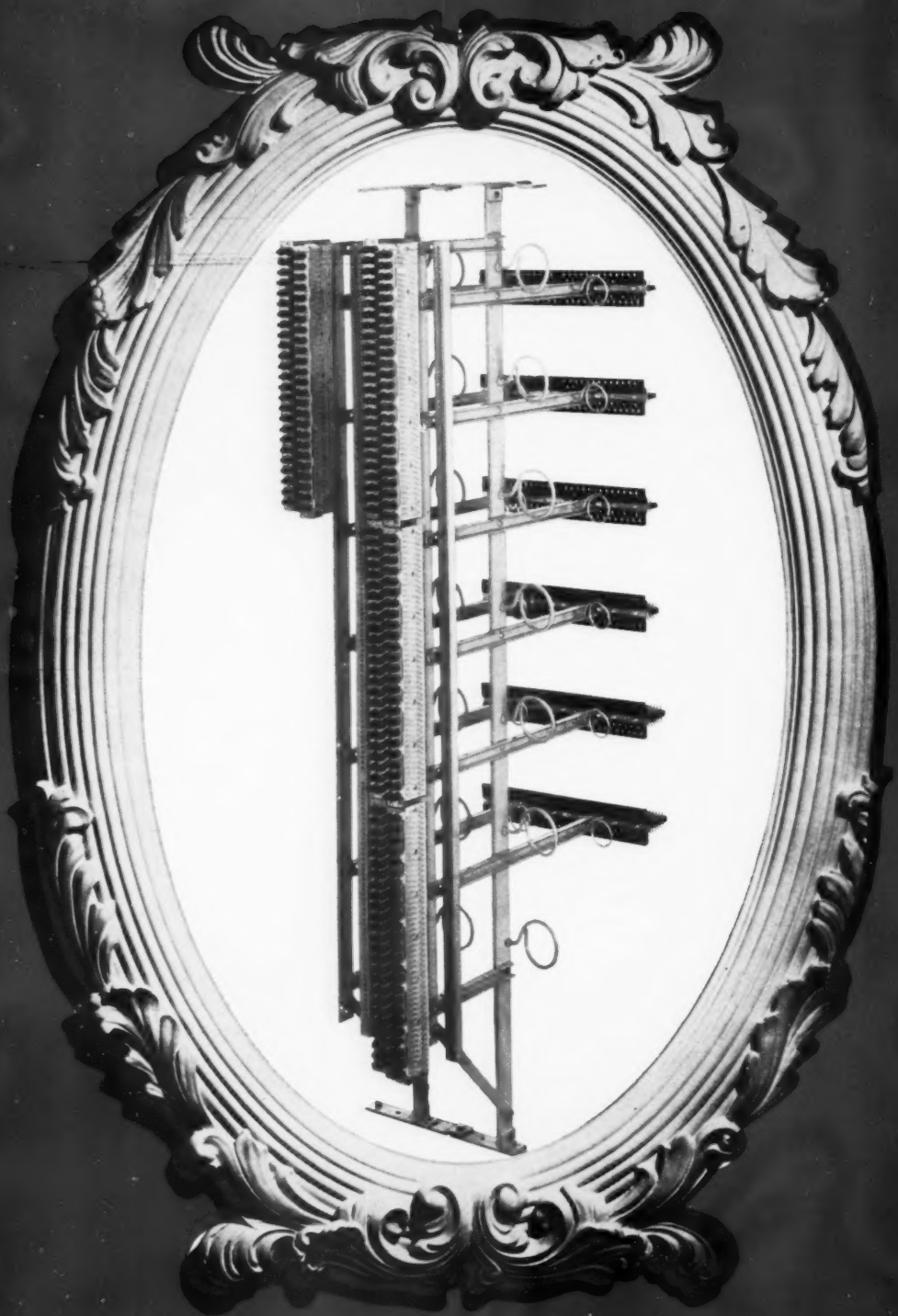
SAFETY
Work-Area Protection Methods Norman J. Phillips 50

VEHICLES
Plant Men Look Over The Compact Car Field Dick Reynolds 66

THE TE&M FRONT COVER

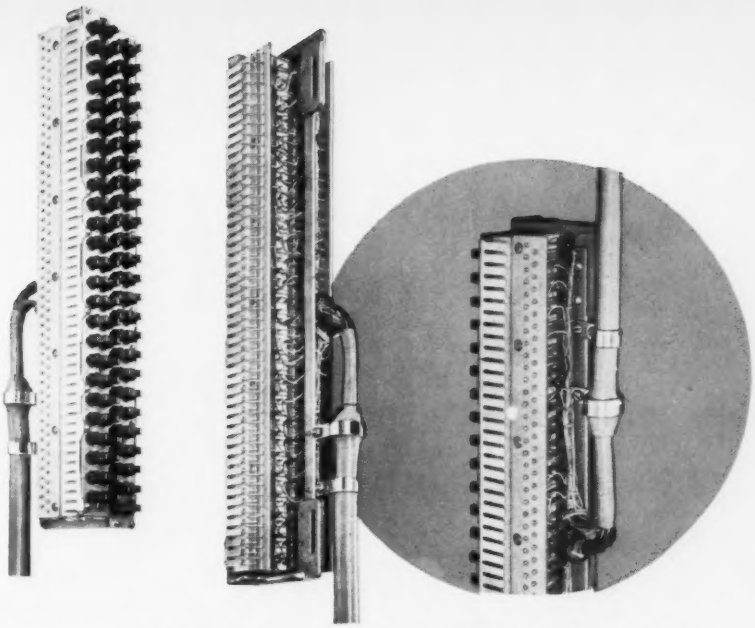
The TE&M Cover photo, showing telephone cable splicers placing traffic cones and high level warning flag standards to protect their work area, sets the scene for this Special "Spring Construction & Maintenance Issue."

Volume 65, No. 8. Published on the 1st and 15th of each month by TELEPHONE ENGINEER PUBLISHING CORP., 7720 Sheridan Rd., Chicago 26, Ill. Office of publication 600 S. 7th St., Rochelle, Ill. Subscriptions, U. S. and Possessions, $4.00 per year; Canada, $4.50; in all other countries, $6.50. Single Copies, U. S. A., 50 cents. Entered as Second Class matter at the post office at Rochelle, Ill. under the act of March 3, 1879. Copyright 1961 by Telephone Engineer Publishing Corp., 7720 N. Sheridan Rd., Chicago 26, Ill. POSTMASTER . . . Please send form 3579 to TELEPHONE ENGINEER & MANAGEMENT, 7720 N. Sheridan Rd., Chicago 26, Ill.



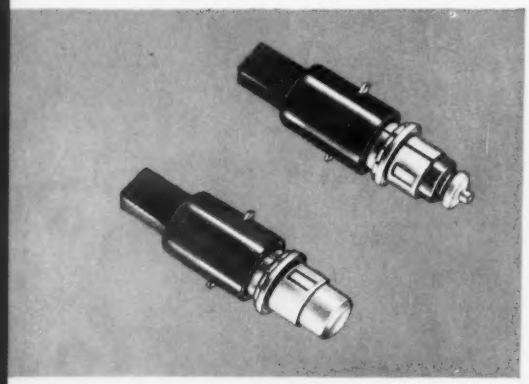
A *Reliable* image of improved main frames

The R300 Connector has a cast resin body, metal faceplate and twistlock inserted protector units. Circuits may be opened without removing the protector units.



Stub cable is wire wrapped to projecting terminals at the back of the connector and is secured to an aluminum reinforced bar. All R300 Connectors are supplied with mounting brackets suitable for attaching to Main Frame protector bars.

Stub cable is 22 or 24 gauge PVC insulated, available in 101 or 51 pair; it is light, flexible and easy to handle.



Protector elements and contacts are completely enclosed in a dust-free high grade plastic assembly.

Catalog No. 3004 protector unit has a standard central office type heat coil and a .004 carbon-to-carbon air gap protector.

Catalog No. 3000 protector unit has a metallic dummy heat coil for use where heat coil protection is not required.

Reliable Type R300 Connectors and Main Frames are designed for installation in new or existing central office main frame rooms as well as P.B.X., P.A.B.X. and sub-exchanges. Connectors may be ordered in 50 or 100 pair banks with or without cable stub.

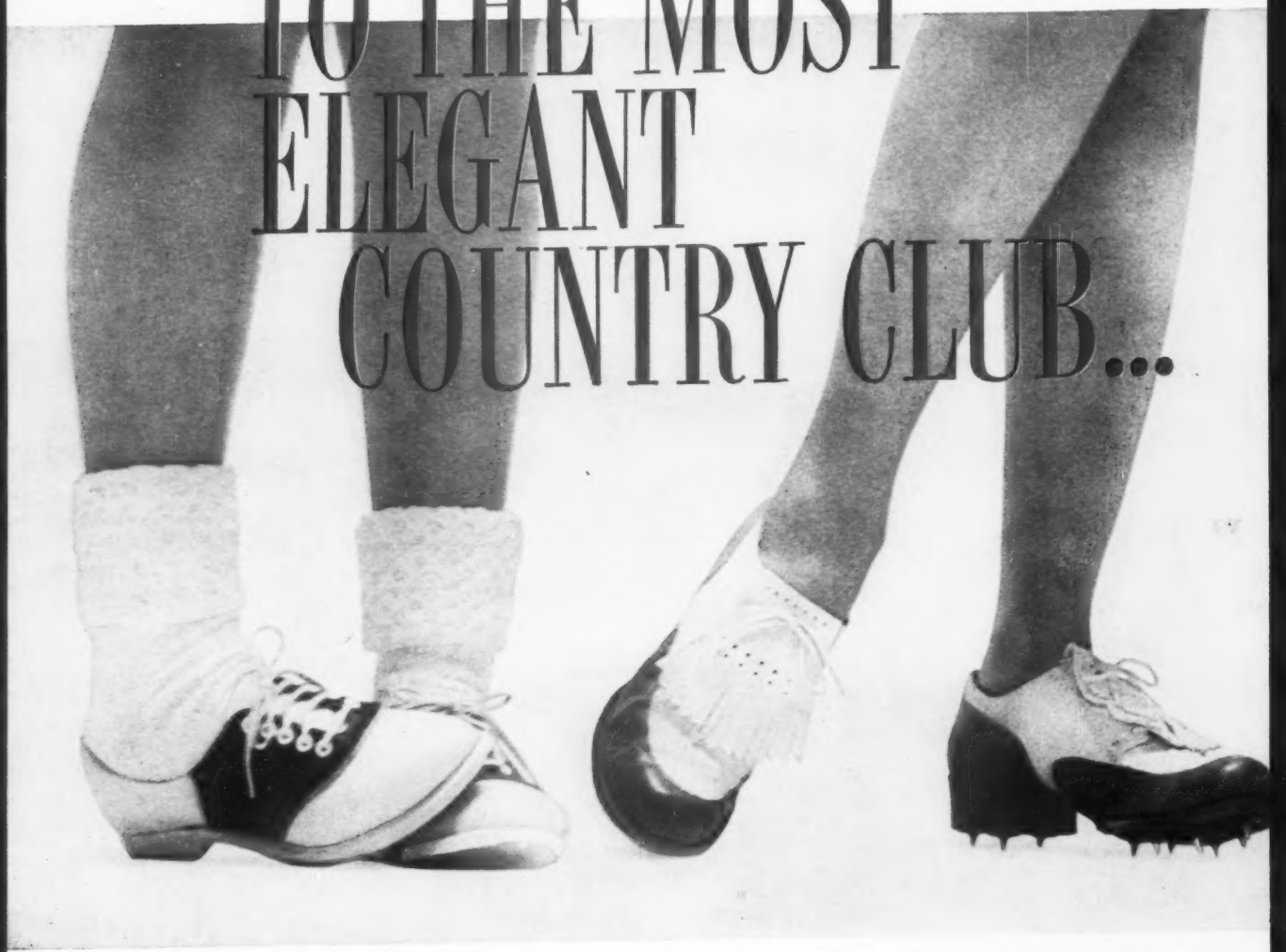
Light and compact, the 100 pair connector can be installed by one man in just a few minutes. Unpacking the R300 Connector is also a one-man operation; it is easily removed from a light, strong corrugated carton without the use of tools.

Write for detailed information in Reliable's Product Data Sheet No. 32.

Reliable ELECTRIC COMPANY • Franklin Park, Illinois

A Symbol of Integrity Since 1909

FROM THE CORNER DRUG STORE TO THE MOST ELEGANT COUNTRY CLUB...



ITT

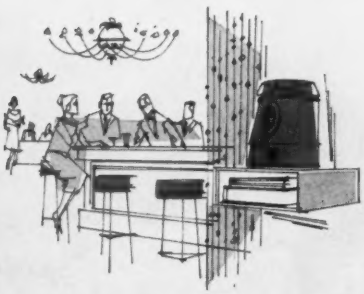
ITT KELLOGG PAYSTATIONS BELONG EVERYWHERE

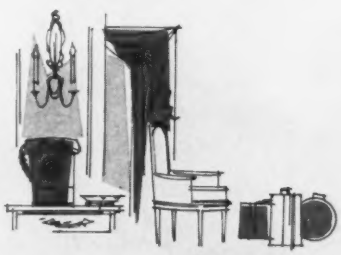
ITT Kellogg Paystations can be quickly installed practically anywhere: in booths or boothettes, on counter tops, can even be used as a *portable* pay phone. Ease of installation, plus maximum security, are achieved through base plate mounting.

Features rugged 2-section pressed steel housing...many standard, and interchangeable, K-500 parts, including K-500 handset and dial mechanism...coded keys, coded self-locking coin boxes...loop resistance 1000 ohms including the instrument. Also available with slug magnet, spare coin box, universal mounting adapter.

In ivory, light beige, light grey. For dial or manual service.

• *ideal for semi-public use . . . eliminates "free calls" from restaurants, lounges, motels, country clubs, etc.*





KELLOGG

A Division of
International Telephone & Telegraph Corporation
6650 South Cicero Avenue, Chicago 38, Illinois

Telephone Department
412 S. Fillmore, Corinth, Mississippi

Regional Offices and Warehouses:
CALIFORNIA: 23 Broderick Road, Burlingame, California, OXford 7-5780.
GEORGIA: 1594 Southland Circle, N. W., Atlanta 18, Ga., SYcamore 4-2441.
INDIANA: 802 Knitters Ave., Fort Wayne, Indiana, Eastbrook 4562.
IOWA: 1111 East River Drive, Davenport, Iowa, 324-0441.
KANSAS: 7th & Sunshine Road, Kansas City 15, Kansas, MAyfair 1-4418.
NEW YORK: 327 North West Street, Syracuse, N. Y., HArrison 2-9251.
TEXAS: 1359 Motor St., Dallas 7, Texas, Riverside 7-5191.

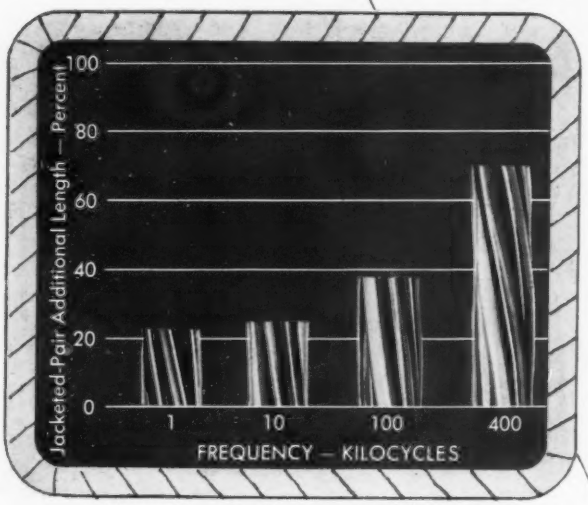
ITT Kellogg products available in Canada
through Standard Telephones & Cables Mfg. Co. Ltd.
9600 St. Lawrence Boulevard, Montreal 12, P.Q., Canada

FOR 1 WITH GENERAL CABLE STALPETH

General Cable Stalpeth: finest exchange area cable available for your outside plant · more guaranteed pairs · unmatched transmission characteristics · sheath uniformity · lighter, stronger, with a choice of splicing methods for lower on-the-job installation costs · most sizes available from stock, also available are composites and combinations · double sheath (DS Stalpeth) for direct earth burial. **Video Pairs:** be sure the cables you install today will meet the demands of new business tomorrow. General Cable Stalpeth, with video pairs installed now makes your plant ready to enjoy the revenues from closed circuit TV, remote TV pickup, microwave links and data transmission...without costly future expansion. **Service:** Multi-plant facilities assure prompt deliveries · Laboratory and engineering personnel are available for consultation. General Cable Corporation, 730 Third Ave., New York 17, N. Y., Distributed by: Automatic Electric Sales Corp., Northlake, Ill.; Leich Sales Corp., 427 W. Randolph St., Chicago 6, Ill.

GCC
GENERAL CABLE CORPORATION

now you can have LONGER LINES with WB JACKETED-PAIR DISTRIBUTION WIRE



Additional length of line permitted for transmission loss based on wet weather characteristics. Jacketed-Pair vs Standard Construction (PE-15 March 1960)

Jacketed-pair Distribution Wire exhibits substantially lower loss during heavy rain and will, therefore, allow a longer line for an equal transmission loss. At one kilocycle this improvement permits a 22% longer line.

Write for full details shown in our new Bulletin T-6.

WB WHITNEY BLAKE CO.

NEW HAVEN 14, CONN. Telephone CHestnut 8-5515 TWX: NH 84

coming CONVENTIONS

OHIO Tel. Assoc., Deshler Hilton Hotel, Columbus, Ohio, April 18-19.

WISCONSIN Tel. Assoc., Plankinton House, Milwaukee, Wisc., May 2-3.

INDIANA Tel. Assoc., Claypool Hotel, Indianapolis, Ind., May 10-11.

ILLINOIS Tel. Assoc., Pere Marquette Hotel, Peoria Ill., May 17-19.

KANSAS-MISSOURI Tel. Association, Continental Hotel, Kansas City, Mo., May 22-23.

PENNSYLVANIA Tel. Assoc., Pocono Manor Inn., Pocono Manor, Pa., June 5-7.

NATIONAL Safety Council's Public Utilities Section, Executive Committee, Laurentien Hotel, Montreal, Quebec, Canada, June 13-14.

WASHINGTON-OREGON Tel. Assoc., Empress Hotel, Victoria, B. C., June 15-16.

NEW YORK Tel. Assoc., Scaroon Manor, Schroon Lake, N. Y., June 19-21.

CALIFORNIA Tel. Assoc., Hawaiian Village, Honolulu, Hawaii, June 26-30.

ALASKA Tel. Assoc., Hotel Not Announced, Palmer, Alaska, Aug. 21-23.

ROCKY MT. Tel. Assoc., Owyhee Hotel, Boise, Sept. 13-15.

MICHIGAN Tel. Assoc., Pantlind Hotel, Grand Rapids, Mich., Sept. 19-21.

NEVADA Tel. Assoc., Stockmens Hotel, Elko, Nevada, Sept. 19-21.

USITA CONVENTION, Conrad Hilton Hotel, Chicago, Ill., Oct. 8-11.

FLORIDA Tel. Assoc., The Carillon Hotel, Miami Beach, Fla., Nov. 26-28.

Here's how to get

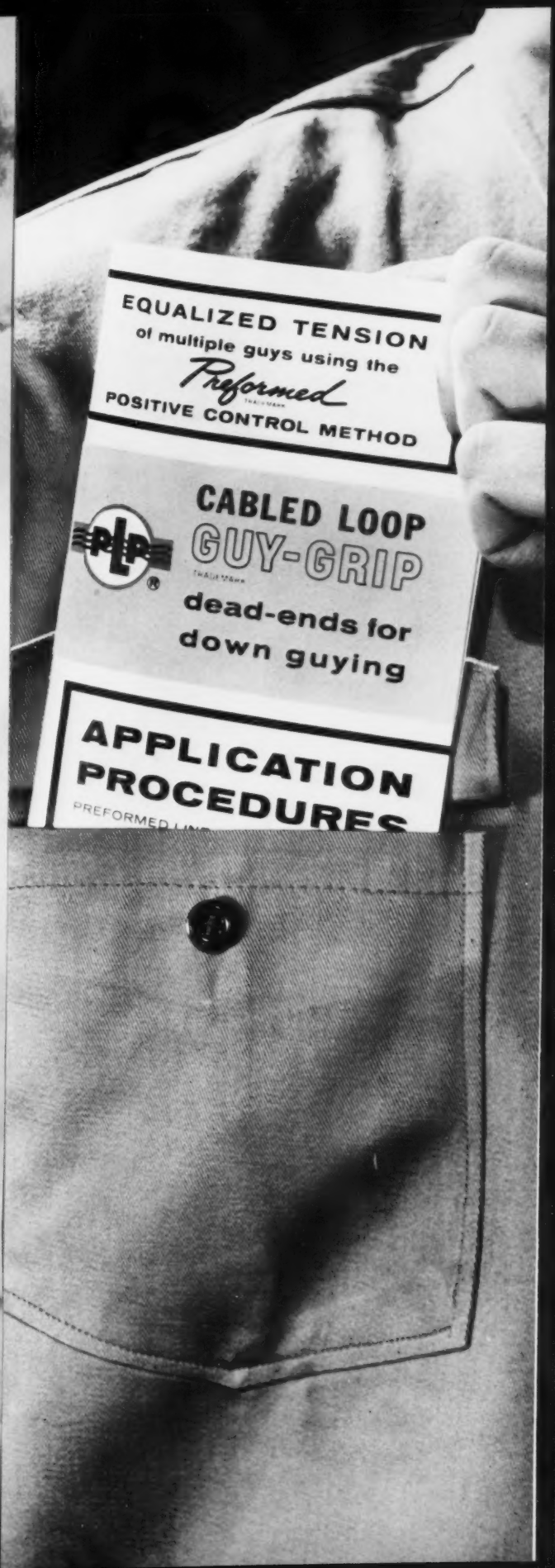
EQUALIZED TENSION

of multiple guys using the

Preformed
TRADEMARK

POSITIVE CONTROL METHOD.....

Write today for the new pocket-sized application booklet, or the file-sized brochure, covering *complete guying procedure* with the CABLED LOOP GUY-GRIP dead-ends.



PREFORMED LINE PRODUCTS COMPANY

5349 St. Clair Avenue
Cleveland 3, Ohio • UTah 1-4900
600 Hansen Way
Palo Alto, California • DA 4-2561

is a trademark which is registered in the U.S. Patent Office and is the property of Preformed Line Products Company.

You can look up to Preformed TRADEMARK

Here's how to get

EQUALIZED TENSION

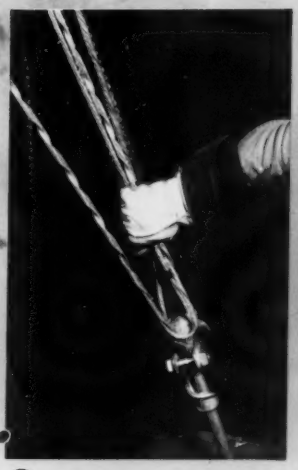
of multiple guys using the

Preformed
TRADEMARK

POSITIVE CONTROL METHOD

Write today for the new pocket-sized application booklet, or the file-sized brochure, covering *complete guying procedure* with the CABLED LOOP GUY-GRIP dead-ends.

Just follow these ke



① Tension the new guy until the existing guy goes slightly slack —then cut the strand about 3" above the rod eye, and align the loop of the GUY-GRIP dead-end and the rod eye.

② Wrap one leg of the GUY-GRIP dead-end onto the strand several turns (as far as the *second* cross-over mark.)

. . . . . EASIER with CABLED LOOP GUY-GRIP TRADEMARK dead-ends

PREFORMED LINE PRODUCTS COMPANY

5349 St. Clair Avenue
Cleveland 3, Ohio • UTah 1-4900
600 Hansen Way
Palo Alto, California • DA 4-2561

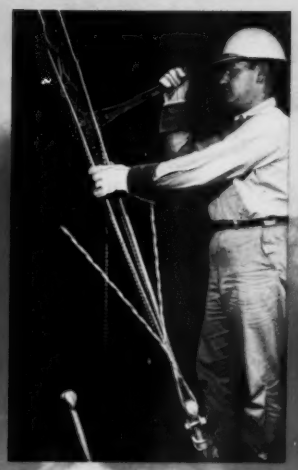
is a trademark which is registered in the U.S. Patent Office and is the property of Preformed Line Products Company.

You can look up to Preformed TRADEMARK

...ey steps...

(shown here by a PREFORMED demonstrator)

③ Similarly wrap on the second leg of the GUY-GRIP dead-end as far as the second cross-over mark.



④ Back off the hoist until both guys are even. Complete the application of the GUY-GRIP dead-end to the strand. Repeat these steps for additional guys . . .

⑤ . . . and you're sure the tension is equalized.

CABLED LOOP GUY-GRIP® dead-ends

SAFEST, FASTEST, and MOST ECONOMICAL method of multiple or single guying

- Easiest for all joint pole construction.
- Compatible materials.
- Easier guying with *high strength strands* — no strand bending required.
- No concentrated stress on strand.
- Less pole rake required.

The product in this advertisement is manufactured under one or more of the following: U.S. Patent No. 2,691,865 and 2,761,273; other patents pending.

In 1858, the first Atlantic Cables were insulated with Bishop Gutta Percha.

Today, Bishop answers industry's critical demands . . . from the tropics to polar regions.

This is the world of BISHOP ELECTRICAL INSULATION

114 years of continuous development and service has established Bishop as a leading producer in the electrical insulation field. Bishop's high standard is maintained in a comprehensive line of plastic and synthetic rubber tapes, epoxy compounds for cable splicing and special compounds for cable repair.

Bi-Seal Self Bonding Electrical Tape

Exclusive Bishop polyethlene base tape is unexcelled for all-weather application in communication and power distribution wire and cable splicing. Available in ½", ¾", 1", 1½", 2", widths.

Superior corona and ozone resistance
Fuses into solid mass
Moisture, corrosion and chemical resistant
High dielectric strength
Superior aging and weathering
Long storage life

Write for catalog or specific data.

Other Bishop Tapes

No. 85 All-Climate Vinyl Electrical Tape

No. 30 High Voltage (Butyl) Splicing Tape

No. 125 Electrical (Butyl) Filler Tape

NEOFIL (Neoprene) Electrical Filler Tape

BI-PRENE (Neoprene) Electrical Jacketing Tape

VINYL ELECTRICAL TAPE No. 1 (.007") and No. 2 (.010")

RUBBER TAPE

BISHOP

Manufacturing Corporation, Cedar Grove, Essex County, N. J.

NEWSLETTER TELEPHONE INDUSTRY

Prepared By The Editorial Staff of TELEPHONE ENGINEER and MANAGEMENT

ON THE 1st OF EACH MONTH ★ ON THE 15th OF EACH MONTH

Dear Sir: April 15, 1961

KENNEDY ASKS ADDITIONAL AMOUNT FOR REA TELEPHONE AND ELECTRIFICATION PROGRAMS . . . Increase of $100,000,000 in amount authorized for loan programs of Rural Electrification Administration in fiscal 1962, beginning July 1, was asked by President Kennedy in a supplemental budget message covering several agencies, including Department of Agriculture, sent to Congress last month.

White House announcement reported that "An increase of $100,000,000 is requested to carry out the loan programs of (REA) at levels more nearly adequate to meet the increased demands for electricity in rural areas. The original budget estimates contemplated reductions in 1962 for both the electrification and telephone loan programs, but current and prospective loan demands in 1962 exceed the 1962 budget recommendations."

The Eisenhower budget, for REA telephone program, estimated that in fiscal 1962 a total of $101,026,000 would be available for telephone loans, with a $100,000,000 new loan authorization including reserve funds from fiscal 1961 & 1962. This compares with $141,026,000 estimated to be available during fiscal 1961, which ends June 30.

GT&E STOCKHOLDERS TO BE ASKED TO AUTHORIZE CONVERTIBLE DEBENTURE ISSUE . . . Authorization by General Tel. & Electronics Corp.'s stockholders to Board of Directors to issue up to $100,000,000 principal amount of convertible debentures will be asked at company's annual meeting, scheduled for April 19, in Gloversville, N. Y., in territory of General Tel. Co. of Upstate New York.

The proxy statement said company "may find it desirable, either in 1961 or 1962, to undertake issuance & sale of convertible debentures." It noted that construction & expansion programs are expected to require expenditures of about $269,000,000 this year and $258,000,000 in 1962. Authorization would run until Dec. 31, 1962, under terms of proposal.

CLAPP PLANS COMPLETE STUDY OF REA TELEPHONE LOAN PROGRAM . . . Rural Electrification Administration is "going to move at once on a complete reappraisal of our telephone program that will probe for facts" in order to determine if criticisms directed at program are warranted, REA Administrator Norman M. Clapp said last month in his first speech to a telephone organization since assuming office Mar. 9.

Addressing annual meeting of North Dakota Tel. Cooperative Assoc. at Bismarck, Clapp said he has heard charges that telephone loan program has for some time been "frozen" at annual level below what some people expected; that co-ops have been receiving increasingly smaller share of telephone loans in comparison with amounts going to investor-owned telephone companies; that area-coverage concept has not been prosecuted as firmly as it should; that equity requirements are more rigidly enforced for co-ops than for commercial companies; that loan applications for co-ops are delayed by frequent & needless referrals back to applicant for additional information; that co-op loan applications are increasingly handicapped by bid-up prices on acquisition of existing properties; that speculators are using REA financing with an eye to quick profits rather than area-

AE has the right equipment for your direct burial installation

What do you need for economical, easy-maintenance burial? Do you need a cable that handles easily, installs quickly? *AE's got it* in General Cable DS Qualpeth. It's specially engineered for fine underground transmission.

Need the economy of polyethylene construction in distribution wire? *AE's got it* in Alphaduct armored wire.

Need sturdy housings with easy access to terminals? *AE's got 'em!* Need loading coils that insure noiseless transmission? Bright warning signs to prevent digging up of your cable? *AE's got 'em!*

To get any or all of these essential buried-plant products, just contact one man—your AE representative. He'll give you full details on all of them.

AUTOMATIC ELECTRIC

Subsidiary of

GENERAL TELEPHONE & ELECTRONICS

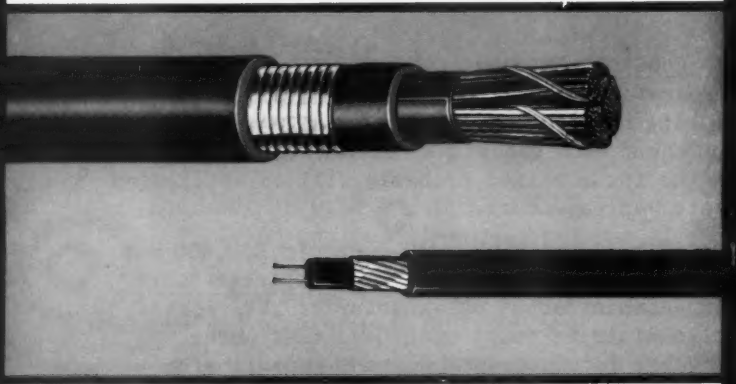
GENERAL SYSTEM

WAREHOUSES:

Northlake	2915 Moore St.	2360 N. W. Quimby St.	158 Corliss Avenue	2021 Main St.
Illinois	Richmond 21, Va.	Portland 10, Ore.	Johnson City, N. Y.	Kansas City 8, Mo.
Fillmore 5-7111	ELgin 8-9280	CApital 3-7244	RA 9-4996	HArrison 1-7575

AE TYPE 60 LOADING COILS. High-voltage coils for use with today's plastic cables. Order them singly or in assemblies of 3, 6, 12, 18, 25 or more coils. U-shaped clips snap on to assemblies to make installation quick and easy.

TERMINALS give easy access to all cable pairs for testing, splicing, loading, protection, cross-connecting and wire distribution. All steel housing. Pedestal type or pole-mounted models. Sizes to accomodate 6 to 400-pair cable.



DS QUALPETH by General Cable. Double polyethylene, plastic-insulated cable gives you extra protection. Choice of aluminum or copper shielding. In conductor sizes 26, 24, 22, and 19 AWG. From 6 to 400 pairs.

ALPHADUCT ARMORED UNDERGROUND DISTRIBUTION WIRE. Available with extra-rugged rubber insulation and neoprene jacket, or with economical polyethylene insulation and jacket. Both types have flat steel ribbons wrapped around insulated conductors.

WARNING SIGNS in eye-arresting yellow field with red and black letters. Gives visible location of cable route, provides protection against digging or trenching. Heavy gauge steel frame. Post is plastic coated to resist corrosion.

(Concluded from page 11)

wide rural service; & that REA has been reducing amount of technical assistance to borrowers.

The new REA Administrator said that agency will place "greater emphasis on telephone cooperatives to bring service to rural areas long neglected by commercial companies. REA will continue to make loans to telephone companies which qualify . . . But REA also will use its Washington & field staff to help local people get cooperatives started wherever the objectives of the program require it."

Mr. Clapp also stated that "In surveying the tools at hand, we must recognize that the cooperative device has some special, distinctive advantages. It is no reflection on the stock company to point out that its primary function is to make money for the investors. The cooperative, on the other hand, springs directly from the desire for service. We want cooperatives that pay their way. The cost of the service must be covered, but the basic drive behind the cooperative must be service at the lowest possible cost."

2-FOR-1 STOCK SPLIT IS APPROVED BY HAWAIIAN TEL. STOCKHOLDERS . . . A 2-for-1 split of common stock of Hawaiian Tel. Co. was approved last month by stockholders at their annual meeting. Their action increased number of authorized shares to 4,500,000 & reduced par value of stock from $10 to $5. Stockholders also gave their approval to a $7,000,000 mortgage bond issue.

President J. Ballard Atherton told meeting that company hopes to pay dividends of 13½ cents a quarter, starting with second quarter of 1961. This would be equivalent to $1.08 a share per year before split. Company has paid $1 a year for last five years.

BILL TO REQUIRE KANSAS COMMISSION TO CONSIDER ORIGINAL COST SHELVED . . . A bill which would have directed Kansas Corporation Commission to use original cost less depreciation as factor in ratemaking has been shelved in lower branch of state legislature. Measure was challenged as retroactive ratemaking by its opponents, & they declared also that the issue raised probably will be settled as result of a current appeal to the state Supreme Court.

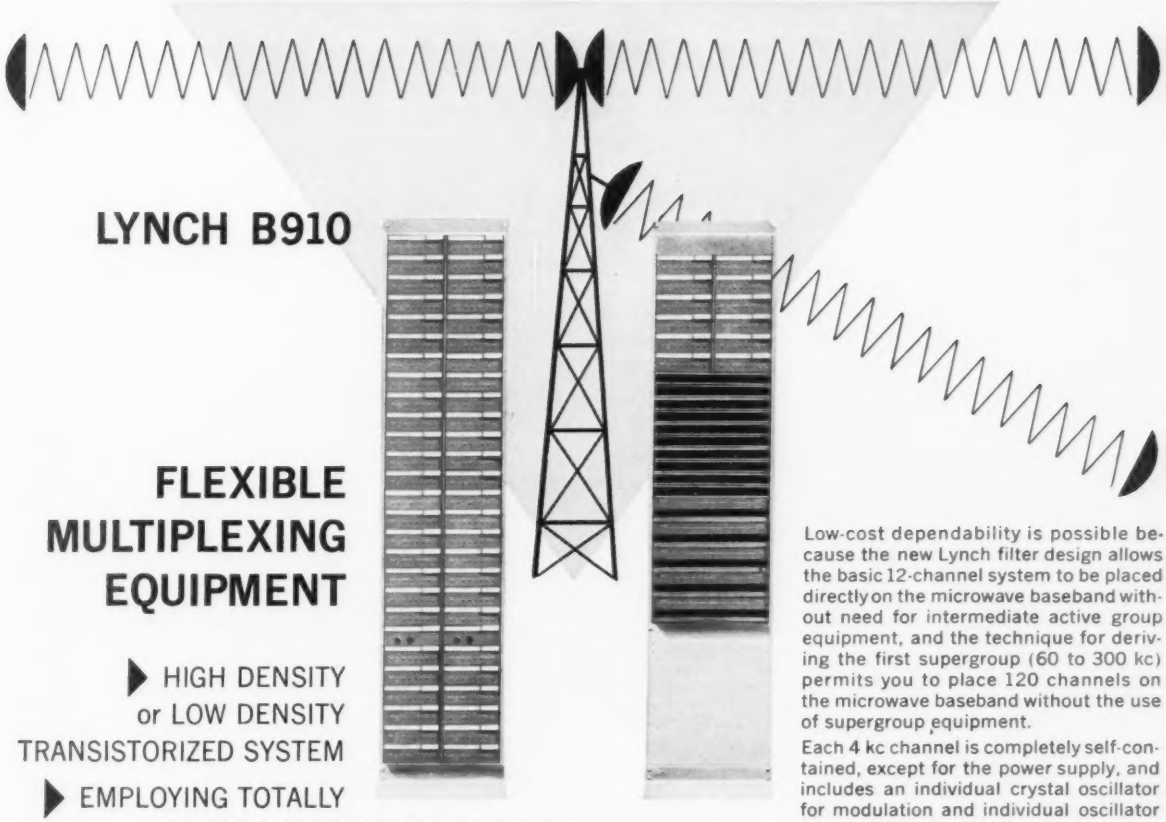
Mentioned frequently in discussion of bill was rate increase of $5,800,000 put into effect by Southwestern Bell Tel. Co. under a Shawnee County District Court decision. The commission, in granting company about one-quarter of its request, used an original cost rate base, while district court concluded that under state law it should have taken fair value into account. Current appeal before state Supreme Court is directed largely at clearing up interpretation of state law. (See TE&M Editorial "That Original Cost Theory," page 33, 3/1/61, and page 37, 3/15/61.)

FLORIDA TOLL COMPENSATION HEARINGS ARE WOUND UP IN DAY'S SESSION . . . The third of four intrastate toll compensation cases reached end of hearing phase last month when hearings before Florida Railroad & Public Utilities Commission on complaint of General Tel. Co. of Fla. against Southern Bell Tel. & Tel. Co. were closed out.

Witnesses at final day's session were General of Florida Vice President Ralph Shriner, who had been put on as rebuttal witness at preceding session, & Walton Alfred, Florida connecting company relations manager for Southern Bell, who gave testimony in rebuttal to Shriner's. Both were concerned with aspects of local exchange loop mileage study in the state. Commission set May 2 for filing of briefs by the parties, & May 23 as deadline for reply briefs.

LOW-COST DEPENDABILITY

IN TODAY'S MOST VERSATILE MICROWAVE COMMUNICATIONS SYSTEM!



LYNCH B910

FLEXIBLE MULTIPLEXING EQUIPMENT

▶ HIGH DENSITY or LOW DENSITY TRANSISTORIZED SYSTEM

▶ EMPLOYING TOTALLY UNIQUE TECHNIQUES TO GIVE YOU THESE ADVANTAGES:

Economical initial purchase of 1 to 12 channels, easy expansion to 600 channels

Lower initial, expansion and maintenance costs

Greater flexibility, with elimination of the need for common equipment

Filter options for easy drop and reinsert configurations

New level of reliability... up to 12 channels without common equipment and up to 120 channels with no equipment common to more than 12, except for power supply

Low-cost dependability is possible because the new Lynch filter design allows the basic 12-channel system to be placed directly on the microwave baseband without need for intermediate active group equipment, and the technique for deriving the first supergroup (60 to 300 kc) permits you to place 120 channels on the microwave baseband without the use of supergroup equipment.

Each 4 kc channel is completely self-contained, except for the power supply, and includes an individual crystal oscillator for modulation and individual oscillator for signaling.

Use of single-sideband suppressed carrier transmission permits maximum utilization of the microwave baseband with minimum loading and substantial noise reduction. This fully transistorized system for microwave multiplexing is also expandable to cable and wire-line operation on a carrier frequency basis.

Two modulation plans available: Plan "A" conforms to CCITT recommendations; Plan "B" facilitates economical and simple "breakout" of groups of 12 or less voice channels at any repeater or junction station by low-cost conventional filtering methods. The system is compatible with a wide range of existing carriers and offers economy, flexibility and unprecedented reliability to small and large users alike.

Lynch®

LYNCH COMMUNICATION SYSTEMS INC.

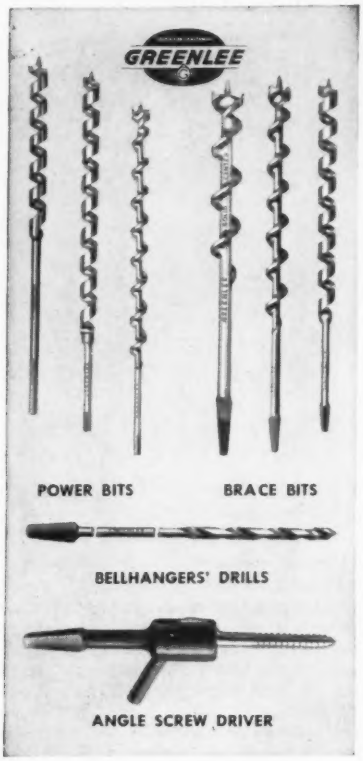
Dept. B-415, 695 Bryant St., San Francisco 7, Calif. • EXbrook 7-1471 • Area Code 415

Distributed by GraybaR

Contact your Graybar Representative or call us direct for complete information.

FAST CUTTING

high-quality tools for pole, crossarm, and wiring jobs...



Installations go smoother, faster when you standardize on precision-made GREENLEE tools. Wide choice of bits, drills, and ship augers for power drill or brace use. See your distributor or write for literature.

NEW GREENLEE NO. 437 UTILITY CHISEL

An all-new GREENLEE chisel for cutting daps in line poles. Blade is 2" wide, and heat-treated the full length for maximum service. Handle can't loosen or come off. Tough plastic handle . . . steel capped . . . extra long for firm, comfortable grip.

GREENLEE TOOL CO.
1778 Columbia Ave.
Rockford, Illinois
GREENLEE

INDUSTRY OBSERVATIONS

By L. A. GRITTEN

WE MAILED our check to Internal Revenue and, as usual, we tried hard to feel happy about it. "We are proud," we proclaimed, "to do our bit for the American Ideal and the privilege of living in this free democracy. Then, also as usual, our friend the Factual Pessimist had to clobber our idealism. He coldly recited the facts of national waste, from Hoover Commission reports, through the farm overproduction subsidies and the billions frittered away in misdirected foreign aid, down to that $200,000 officers club annex in Paris that was squelched by President Kennedy in the nick of time.

Hoping to combat his doleful pessimism, we dived into the records. But, alas, for every damning item of government waste he had mentioned there were dozens he had overlooked. Misuse of the $40 billions a year the government gouges out of us in income tax is a stark tragedy. Perhaps we need a new and far stronger "Hoover Commission," one with teeth and a few "boiling oil and molten lead" penalties. And we need more taxpayers to become interested and articulate about what happens to their money. Worst of all is not what we pay in cash but what we do not even realize. As Paul Harvey said in "Only People Pay Taxes": "The best kept secret in the United States today is the whole size of the tax load."

We, the form filler-uppers must wage war on wasted taxation. Taxpayers of the U.S.A. unite! You have nothing to lose but your Forms 1040!

Brains Wanted

THE National Inventors Council (U. S. Department of Commerce) has issued a revised list of "Inventions wanted by the Armed Forces and other Governmental agencies." It is a fascinating compilation. Inventors may bite on almost anything from "erasable, magnetic tape which provides an information storage density of at least 10^{12} bits per cubic foot," or an electrical generator giving "both AC and DC power from shafts turning at 50,000 to 100,000 rpm," to improvements in packaging and freight handling.

Hope From Africa

RECENT news anent the Dark Continent includes:

Experts predict that in the future Africa will greatly influence European and American styles and fashions.

Stewart Alsop (Sat. Eve. Post 3/25/61) says: "In Africa the backside has the same symbolic significance as the bosom in our culture, and falsies are worn on the behind."

Hundreds of our lovely American telephone girls, who have worried about their steatopygic redundance (vulgarly described as "operator's spread"), may now relax. Thanks to Africa, they will enjoy a new lease of feminine attraction.

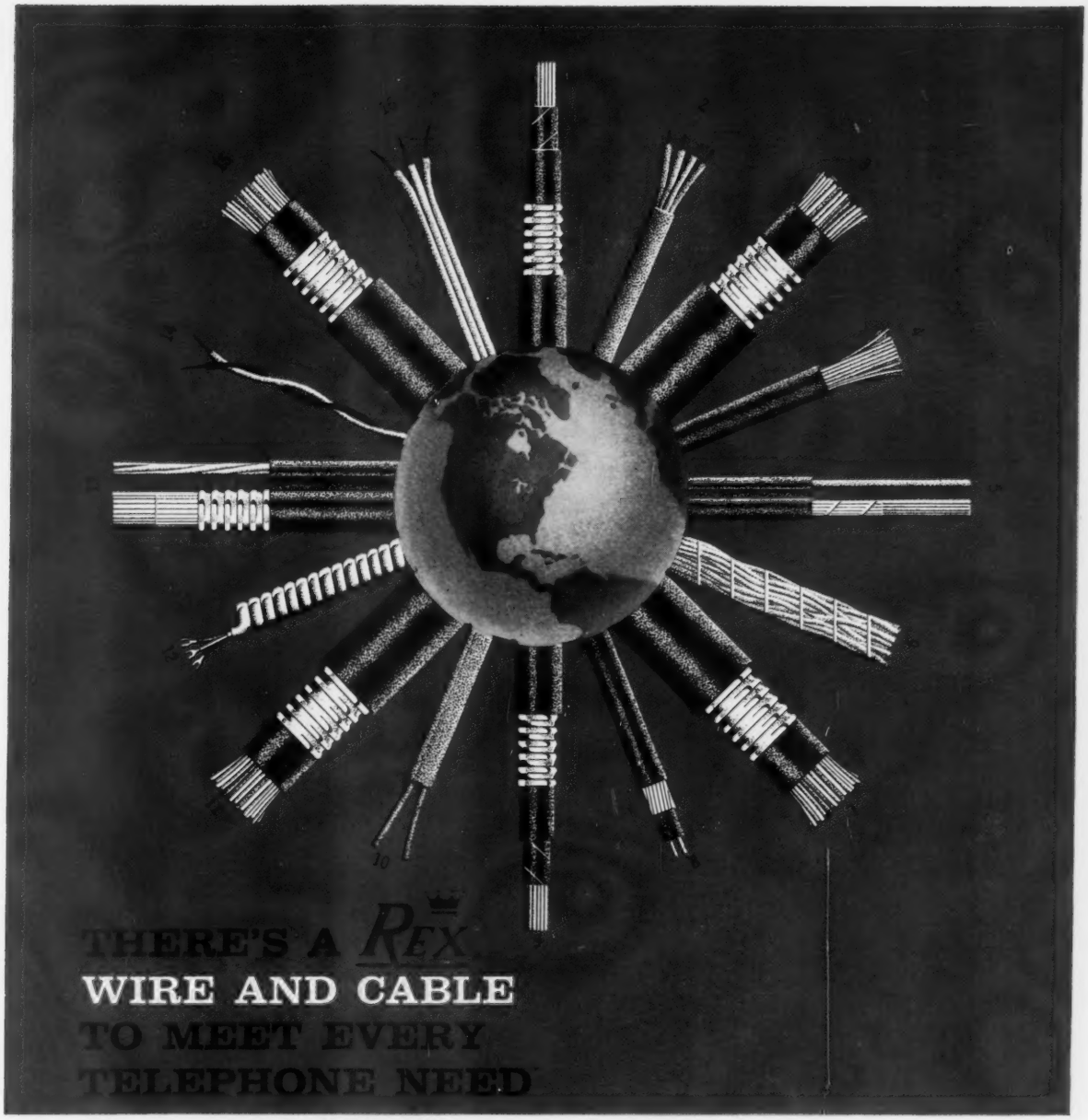
The Minimum Wage

PROPONENTS of the increased minimum wage tell us that past increases of wage minima have not resulted in price increases.

Perhaps not, but the U. S. Labor Department, after a study of the 1956 raise from 75¢ to $1.00, found "significant declines in employment in most of the low-wage industry segments studied."

Why? Employers cut payrolls, replaced their less efficient workers,

Please turn to page 20



IN THE WORLD!

No.	Cat. No.	Type	Specification
1	DBCP	Direct Burial Exchange Cable	REA-PE-23
2	IPJ	Jacketed Inside Station Wire	—
3	ADCP	Aerial Exchange Cable	REA-PE-22
4	D	Inside Wiring Cable	—
5	8RDW	Figure 8 Rural Distribution Wire	—
6	RDW	Rural Distribution Wire	REA-PE-15
7	ADCP	Aerial Exchange Cable	REA-PE-22
8	PBW	One Pair Armored Burial Wire	REA-PE-24

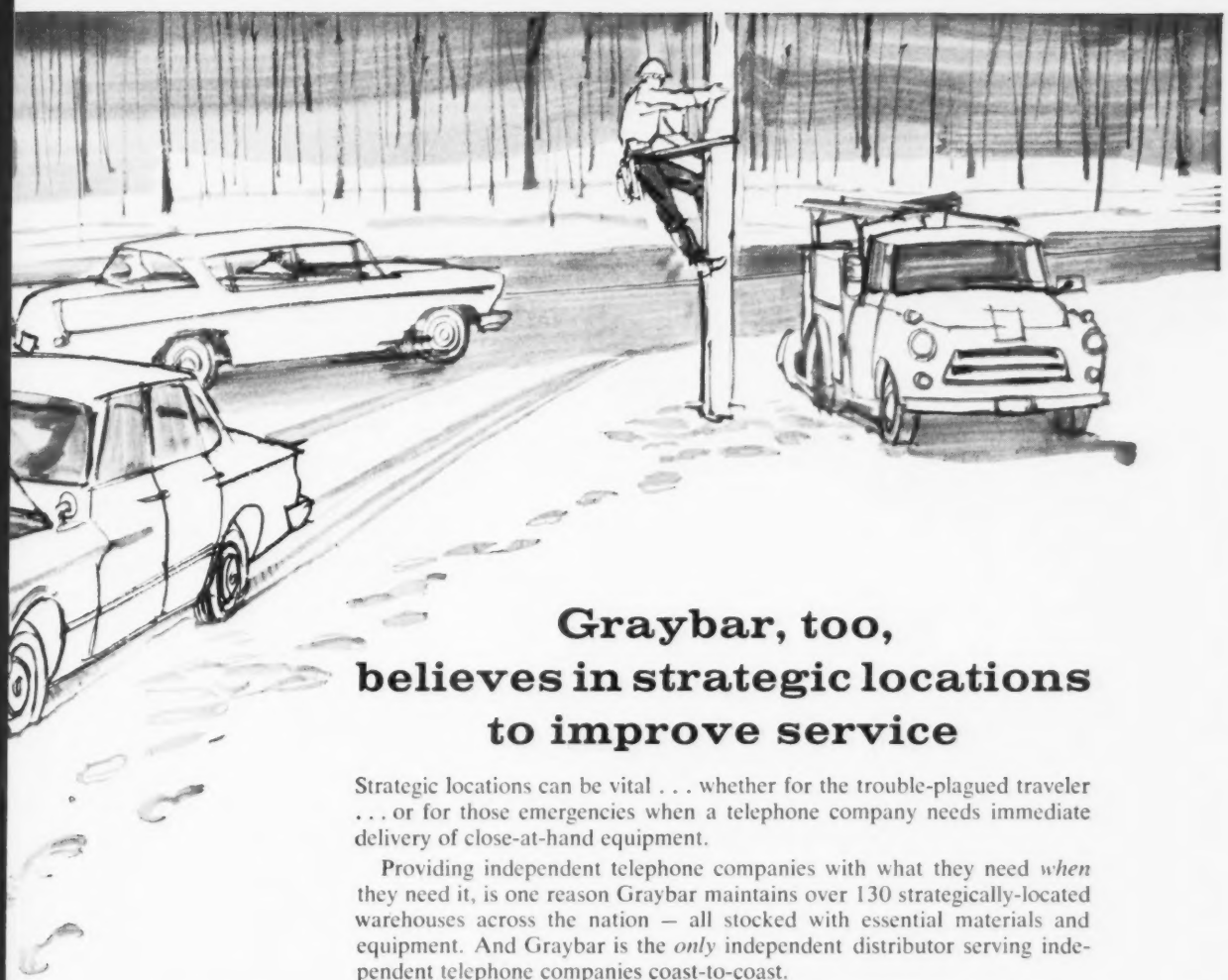
No.	Cat. No.	Type	Specification
9	DBCP	Direct Burial Exchange Cable	REA-PE-23
10	OPDW	One Pair Aerial Distribution Wire	REA-PE-17
11	ADCP	Aerial Exchange Cable	REA-PE-22
12	—	Retractile Cords	—
13	AS48	Figure 8 Aerial Exchange Cable	—
14	IP	Inside Station Wire	—
15	ADCP	Aerial Exchange Cable	REA-PE-22
16	IPL	Parallel Inside Station Wire	—

BRAND-REX

Division American ENKA Corporation
31 Sudbury Road, Concord, Massachusetts
Phone: Emerson 9-9630

IF YOU TALK TELEPHONE, REX SPEAKS YOUR LANGUAGE

HONE
TELEPHONE



Graybar, too, believes in strategic locations to improve service

Strategic locations can be vital . . . whether for the trouble-plagued traveler . . . or for those emergencies when a telephone company needs immediate delivery of close-at-hand equipment.

Providing independent telephone companies with what they need *when* they need it, is one reason Graybar maintains over 130 strategically-located warehouses across the nation — all stocked with essential materials and equipment. And Graybar is the *only* independent distributor serving independent telephone companies coast-to-coast.

From these locations you can obtain *everything* you require. You also get that extra measure of genuinely personal service that comes from an *independent* company . . . a company operated by the people who built it, own it, and want to increase its value to customers.

Next time, call in your Graybar man. He is *strategically* near-at-hand; always eager to serve you personally.

995

The only independent distributor serving you coast-to-coast

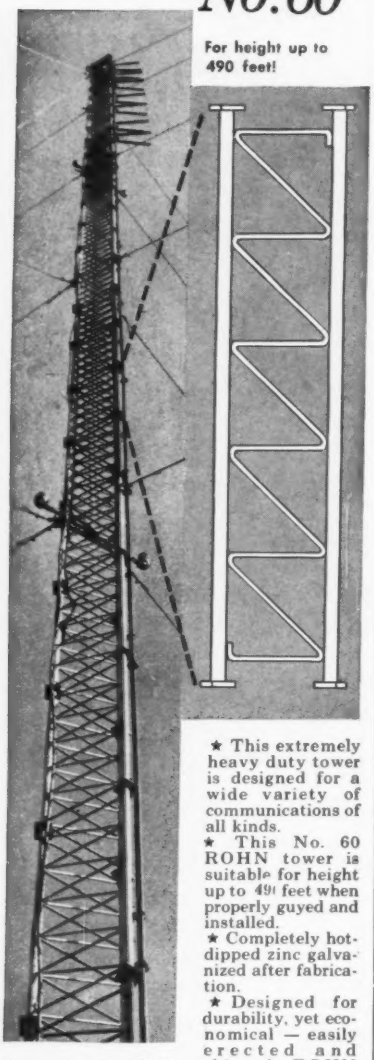
GraybaR

ELECTRIC COMPANY, INC.

420 LEXINGTON AVENUE, NEW YORK 17, N. Y. • OFFICES IN OVER 130 PRINCIPAL CITIES

Everything Electrical GraybaR

ROHN COMMUNICATION TOWER *No. 60*



For height up to 490 feet!

★ This extremely heavy duty tower is designed for a wide variety of communications of all kinds.
★ This No. 60 ROHN tower is suitable height up to 490 feet when properly guyed and installed.
★ Completely hot-dipped zinc galvanized after fabrication.
★ Designed for durability, yet economical — easily erected and shipped. ROHN towers have excellent workmanship, construction and design. Each section is 10 feet in length.

Shown above is a ROHN No. 60G tower used for FM broadcasting, installed to a height of 300 feet.

FREE

Details and complete engineering specifications gladly sent on request. Also ROHN representatives are coast-to-coast to assist you.

Write-Phone-Wire Today!

ROHN *Manufacturing Co.*
Box 2000,
Peoria, Illinois
Phone 637-8416
"Pioneer Manufacturers of Towers of All Kinds"

(Concluded from page 16)

raised production quotas, and installed more efficient machinery.

In our own industry, an increased minimum may be expected to hasten the completion of our transition to one hundred per cent automatic switching, and also the absorption by larger operators of many of the remaining small manual-operation Independent companies.

Retreat From Socialism

POSTMASTER General J. Edward Day's reversal of his predecessor's policy anent facsimile transmission is good news for private industry. The "Speed Mail" program has been abandoned. Good enough! Anything in telecommunications, electronic or otherwise, that a government department can run can be handled better by our operating telephone companies.

The Post Office censorship of foreign mail and literature has also been curtailed. That has been long overdue. About eighteen months ago, Post Office censors seemed to have reached the very apex of idiocy when they barred the mailing of reproductions of Goya's masterpiece "The Naked Maja." Recently that record has been beaten. In their crusade against everything "subversive," coming from Russia, they turned back a handbook on "Chess for Beginners." This, while the U. S. Department of Commerce is actively and intelligently abstracting and translating everything Russian it can obtain that may be useful to an American scientist, engineer or student.

We may hope that the Post Office officials will now leave our morality to schools, churches and parents and our politics to those better qualified; they will have plenty to do to bring our mail service up to the standard that prevails in many other countries.

"Baa, Baa, Baa"

THOSE who saw *"Sundowner"* enjoyed a most interesting and unusual movie. (Don't miss it!). However, it had nothing to do with telecommunication; it was about the Australian farmers who have more than one hundred million sheep scattered over huge areas in which Texas could be lost as easily as Rhode Island.

Now we read that the shepherds have "gone modern." They equip the leaders of their flocks with tiny radio transmitters. Periodically they emit "beeps." The farmer catches them on his direction-finder and little Bo-Beep is more expeditiously converted into wool socks and lamb chops.

The People's Capitalism

THOSE who think the best answer to communism is to make every man a profit-conscious capitalist will enjoy a recent report of the New York Stock Exchange. Over 101,000 investors are now buying stocks under the N.Y.S.E.'s monthly investment plan. Nearly eighty per cent of them leave their dividends with their broker for automatic reinvestment. American Tel. & Tel. is included in the five stocks most popular with the monthly payment investors.

Baggage Smashers

THE U. S. Air Force has made scientific tests of the art and craft of parcel smashing. Containers secretly equipped with recording devices were sent on cross-country shipments by air, rail and truck. The study may not reduce the amount of damage; it could result in the formation of a new Hoffa union, the International Brotherhood of Parcel, Package and Bag Smashers, or something like that. But it may help us to make up our own packages so that a reasonable proportion of the contents will be recognizable on delivery.

The study revealed that marking your parcel "FRAGILE — HANDLE WITH CARE" is a waste of time. Packages so marked, whether sent by air, rail or truck, all took about the same amount of beating as those not marked.

Incoming packages were treated more daintily than outgoing packages. (Possibly because the incoming handlers were nearer to prospective complainers?)

For some valuable and interesting details: "Measuring Field Handling and Transportation Conditions" — P B 161 918. Obtainable from O. T. S., U. S. Department of Commerce, Washington 25, D. C. $1.

PROFIT

by installing

COOK

BD PEDESTALS

and accessories

Featuring:

- Faster, easier installations.
- Greater accessibility.
- Captivated bolts.
- Fewer loose parts.
- A full line of accessory equipment.

Catalog Number	BD Type	BD PEDESTALS: Prot. & Unprot. Term Blk Cap. Qty.	Prot. & Unprot. Term Blk Cap. Size	Load Coil Capacity Qty.	Load Coil Capacity Size	Maximum Cable To Be Spliced Pairs	Maximum Cable To Be Spliced Gauge
521-119	1 & 2	2	1 pr., or	2	1 pr., or	2 buried wires or	
		3	6 pr.	2	3 pr.	18	22
521-110	1A & 2A	3	6 pr.	2	3 pr.	18	22
521-120	3	6	3 or 6 pr.	6	3 pr.	100	22
521-136	3A	6	3 or 6 pr.	6	3 pr.	100	22
521-166	4	10	3 or 6 pr.	10	3 pr.	400	22
521-183	4A	10	3 or 6 pr.	10	3 pr.	400	22

BD TERMINAL ACCESSORIES

Catalog Number	Protected Terminal Blocks, Without Leads
81-175	Reflective warning sign.
81-280	3 pair, with 41-285 arrester.
81-281	6 pair, with 41-285 arrester.
81-285	3 pair, with 41-610 arrester.
81-286	6 pair, with 41-610 arrester.
81-200	6 pair, unprotected terminal block, without leads.
81-184	6 pair, washer gap protected, without leads.
81-196	Aluminum warning sign.

See your local distributor

COOK ELECTRIC Company

Since 1897

2700 SOUTHPORT AVENUE CHICAGO 14, ILLINOIS

ALCOA BOOTHS BOOST REVENUE BY 15 PER CENT!

In Hickory, North Carolina, Central Telephone Company reports:

"More than half our outdoor booths are Alcoa Aluminum outdoor booths," says Mr. W. R. McGrew, division manager for Central Telephone Company, Hickory, N. C. "And some of them have been in use for more than four years. We estimate a *10 to 15 per cent increase in revenue* from Alcoa booths over others!

"Maintenance-free, easy to keep clean and neat, well lighted, Alcoa booths seem to actually *attract* customers. Doors don't stick . . . glass breakage is less . . . and we don't have to constantly repaint aluminum booths," Mr. McGrew avers.

Solidly built with Alcoa® Aluminum Extrusions, these booths resist normal wear and tear—and vandalism as well! The Alumilite* finish stays bright and clean. Aluminum won't rust . . . resists corrosion. If space is no problem, look to large and sturdy Alcoa outdoor booths. For indoor (and sheltered exterior) installations, check on the new Alcoa "Compact" booth—only 28¾ in. square! Whichever booth you need, call your telephone supply jobber . . . or write: Aluminum Company of America, 1781-D Alcoa Building, Pittsburgh 19, Pa. World-wide sales through Alcoa International, Inc., 230 Park Avenue, New York 17, N. Y.

*Trade Name of Aluminum Company of America

ALCOA ALUMINUM

ALUMINUM COMPANY OF AMERICA

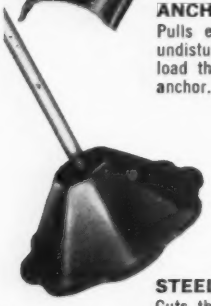
Build lines to stay with
CHANCE
ANCHORS
there's one for every need

8-WAY EXPANDING ANCHOR
Slips down a hole no bigger than the base plate. 8 rib reinforced blades expand into solid earth all the way around.

NO-WRENCH SCREW ANCHOR
Pitch-controlled blade goes down fast and adds to holding power. Can be installed by hand.

POWER INSTALLED SCREW ANCHOR
Lets you mechanize screw anchor installation with your power hole-digging equipment. Anchors install in 6 to 8 man minutes.

NEVER-CREEP ANCHOR
Pulls entirely against solid, undisturbed earth. Holds more load than any other type of anchor.



STEEL CONE ANCHOR
Cuts the costs of guying in hardpan, abode clay, or rocky soil. Gives exceptional holding strength.

EXPANDING ROCK ANCHOR
Expands and wedges against solid walls of rock. Does away with expensive lead or concrete grouting.

CA61-8

A. B. CHANCE CO.
CENTRALIA, MISSOURI
A. B. Chance Company of Canada, Ltd., Toronto

keeping up with COMMUNICATIONS

Senator Magnuson makes moon bounce call . . . New satellite doppler tracking system can receive and convert signals from a satellite whose orbit is known.

Sen. Magnuson Makes "Moon Bounce" Call

STEAM shovels 3000 miles from the Senate Office Building began breaking ground Feb. 21, for the science exhibit at the 1962 Century 21 international exposition in Seattle, Wash., on a voice cue from Senator Warren G. Magnuson (D., Wash.) sent over a 500,000-mile circuit via the moon.

Senator Magnuson's "moon bounce" telephone call climaxes observances at the site of the exposition, which will feature the "space age" theme. The 6½-acre science pavilion will be sponsored by the federal government, under a $9,000,000 appropriation made in 1959. The 74-acre, $80,000,000 exposition, with 750,000 square feet of exhibit space, will incorporate five major "worlds," including the science building and another devoted to commerce and industry.

The 500,000-mile telephone call was sent by landlines to the Bell Telephone Laboratories' installation at Holmdel, N. J., where it was transmitted to the moon on 960.5 megacycles, with 10 kilowatts power. It was received at the General Electric Co. laboratory at Schenectady, N. Y., and traveled the rest of the way over conventional telephone facilities.

Arrangements for the call were made by the American Telephone & Telegraph Co. In addition to GE, four Bell System operating companies — the Chesapeake & Potomac, New Jersey Bell, and New York Telephone Cos., and Pacific Telephone-Northwest — participated. Several months ago, Pacific Telephone-Northwest became the first business organization to sign up for an exhibit at the international exposition, which will run for six months starting April 21, 1962, and is expected to attract 10,000,000 visitors.

Senator Magnuson, in his call, described the "moon bounce" telephone call as typical of the Century 21 spirit, and a "far cry from the conventional."

Those attending the ceremony in Senator Magnuson's office were given an opportunity to listen to the received signal in Seattle, demonstrating the two-and-a-half second time interval required for the transmission to cover the half-million mile route.

ITT Develops Satellite Doppler Tracking System

A SATELLITE Doppler tracking station, forerunner of a navigation system to permit sea-going vessels to navigate regardless of weather conditions or distance from land, has been announced by ITT Federal Laboratories of International Telephone & Telegraph Corp., Fort Wayne, Ind.

The equipment can receive and convert signals from a satellite whose orbit is known into a form that can be further processed to establish the location at which they are being received with an accuracy of better than half a mile. Conversely, this equipment can determine the orbit of a transmitter satellite when the location of the shipboard or ground station is known.

The equipment relies on a well-known scientific principle called the "Doppler Effect" after its discoverer, the Austrian scientist, Christian Jo-

WEST COAST TELEPHONE COMPANY CHOOSES COLLINS MICROWAVE

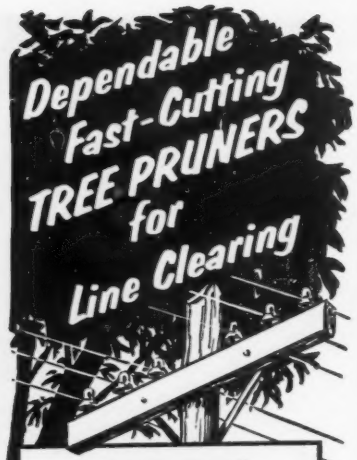
to link Puget Sound island communities with mainland . . .

This frequency diversity system provides 56 channels for service to communities on Camano and Whidbey Islands out of a terminal at Everett, Washington. Included are more than 25 miles of overwater spans. Another Collins system installed for this company more than 3 years ago provides service between Anacortes and Mount Vernon. For information on a microwave system custom-tailored to your own needs, contact Collins Radio Company, Texas Division Sales, 1930 Hi-Line Drive, Dallas 7, Texas.

COLLINS MICROWAVE AND CARRIER

COLLINS

COLLINS RADIO COMPANY • DALLAS, TEXAS • CEDAR RAPIDS, IOWA • BURBANK, CALIFORNIA



POLE PRUNERS

No. 11
Cuts up to 1" branches. A strong, durable, easy cutting 18 foot tree pruning unit. Spruce extension poles in 6 foot sections, with telescoping aluminum joints.

No. 12
Cuts up to 1½" branches. Pruner head is malleable iron casting, husky, unbreakable. Smooth, easy cutting action.

LOPPING SHEARS
Heavy duty, fast easy cutting loppers designed for utility use.

No. 75
Compound lever cutting action, smoothly slices through 1¾" to 2" branches.

Nos. 525, 530
The famous "Tiffany" pattern lopping shears 25" and 30" models. Cut branches up to 1¾".

PRUNING SAWS

No. 1826
26" blade of Sandvik Swedish steel especially designed for true work. For those spots where a chain saw can't operate.

Send for literature and additional information on pruning tools of all types.

Quality Tools
SEYMOUR SMITH
Since 1850

SEYMOUR SMITH & SON, INC.
Oakville, Connecticut, U. S. A.

Sales Representative
JOHN H. GRAHAM & CO. INC.
105 Duane Street, New York 8, New York

"Keeping Up With Communications"

(Concluded from page 24)

hann Doppler. The "Doppler Effect," discovered in 1842, is the apparent change in the frequency of sound, light or radio waves observed when the source and the observer are in motion relative to one another. The effect is perhaps most easily noted when a passing car blows its horn. To the listener, the sound varies from a higher to a lower pitch because successive sound waves from the horn, even though regularly spaced, reach the listener more frequently as the car moves toward him and less frequently when it moves away. The sudden switchover — from high-to-low at the moment when the car passes — is quite noticeable.

A Doppler Tracking Station measures a similar shift in radio frequencies, transmitted from a passing satellite, to obtain its results.

The equipment was developed to be compatible with the Navy's transit navigational satellite system by ITT's Astrionics Laboratory, Fort Wayne, Ind. This laboratory is now under contract to supply stations for determining satellite orbits to the Navy's Pacific missile range for shipboard use.

The transit navigation system principle was conceived by scientists of the Applied Physics Laboratory of John Hopkins University as a result of early experiments in the Doppler tracking of artificial satellites. As a result, the Applied Physics laboratory has been given responsibility for the further development of the transit navigational satellite system under the direction of the U. S. Navy's Bureau of Weapons.

The ITT equipment, recently demonstrated to Navy personnel, can automatically search for, acquire and track satellite signals thus requiring a minimum of operator attention.

"Angle Diversity" To Be Feature of New O/H System

AN EXPERIMENTAL communication system is being developed by International Telephone & Telegraph Corp. to evaluate new concepts in radio transmission and reception.

Under an Air Force Research and Development Command contract ITT Federal Laboratories, Nutley, N. J., will engineer and construct an over-the-horizon (O/H) radio link in cooperation with the Rome (N. Y.) Air Development Center at Griffiss Air Force Base. The system will connect Ransomville and Verona, N. Y., a 170-mile hop that incorporates the most advanced principles in microwave communication.

In common with other O/H systems, the upstate New York link will use the tropospheric layer of the earth's atmosphere as a reflector for scattering radio signals downward to large receiving antennas. But unlike any link in existence, the experimental system will transmit the same signal simultaneously along seven different paths separated by fractions of a degree. Seven transmitters will be used to generate the signals. These then are beamed against a 28-foot antenna that will direct the transmissions toward the troposphere.

At the distant terminal, 14 receivers, each equipped with hypersensitive device that minimizes static and thermal noise (interference caused by heat in the system) will "acquire" the scattered beams and feed them to a novel combining system. The resulting combined signal will incorporate the best characteristics of all seven.

This will be the first time that multi-beam transmission and multifold "angle diversity" — transmitting the same signal along so many different paths at the same time — will be used in an O/H communication system.

To insure precise and comprehensive evaluation of these concepts, complete data processing facilities will be installed with the system.

ITT engineers believe that the data acquired from this effort will ultimately result in improved quality and extended range of over-the-horizon radio as well as a better understanding of the scatter phenomenon which makes it possible.

USITA

a vital influence in all 50 states

There are no boundaries in the function of the USITA to encourage the extension of service of independent telephone companies to their subscribers. Alaska to Hawaii and throughout continental U.S.A., the trend among Independents to provide better and more dependable communications systems is a steadily growing one. This upgrading accounts for the choice of Sherron steel booths in the modernization programs of more and more Independents.

You're not likely to see many all white telephone booths. The one in the above inset is in Honolulu's Queen's Hospital, and illustrates the adaptability of Sherron steel booths to any location, any environment, any decor. Hawaiian Telephone will soon complete the installation of a series of Sherron steel multiple booths at the new Honolulu International Airport. This latest project typifies the services provided by this company throughout the Hawaiian Islands.

as evidenced by HAWAIIAN TELEPHONE COMPANY

SEE OUR CATALOG IN SWEET'S — INDEPENDENT — Sherron ACOUSTIC 'I' SEE-THRU STEEL—STAINLESS STEEL OUTDOOR AND INDOOR TELEPHONE BOOTHS

There's a Sherron booth for every location and budget in either zinc coated or stainless steel

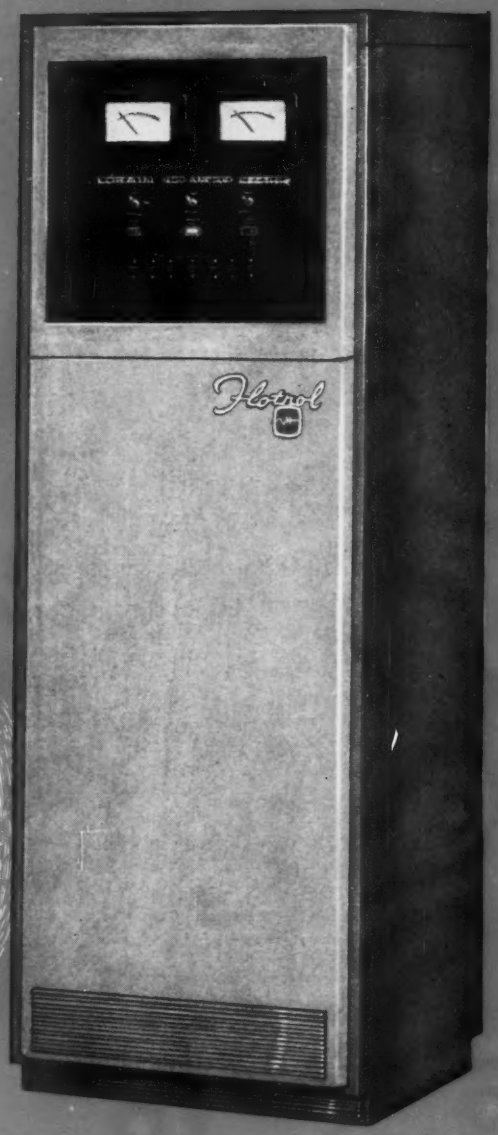
SHERRON METALLIC CORP., 1201 FLUSHING AVE., BROOKLYN 37, N.Y.

another "milestone" from Lorain

THE NEWEST OF THE

FLOTROL

BATTERY CHARGERS



TRANSILICONIZED

- Sensitive TRANSISTOR Control
- SILICON Rectifiers—protected against starting and load surges

All of the Flotrol features of the past—plus many new Lorain features—now in a single small compact unit. Write for literature.

MODEL F400D50

INPUT: 208/230 Volts, 60 Cycle, 3 Phase.
OUTPUT: 43 to 57 Volts DC, 400 Amperes.

Other models available.

LORAIN *Products Corporation* LORAIN, OHIO

LORAIN PRODUCTS (CANADA) LTD.—ST. THOMAS, ONTARIO

DESIGNERS AND MANUFACTURERS
SUB-CYCLE® CONVERTERS
FLOTROL® RECTIFIERS
PARTNERS IN DEPENDABILITY

Bell-USITA Agreement on WATS Reported

AT&T ANSWERS FCC QUESTIONS ON "TELPAK"

USITA, Bell representatives reach agreement providing annual increase to Independents of $10,000,000 in message toll settlements . . . AT&T answers questions raised by FCC and Western Union regarding "Telpak."

By ROLAND DAVIES and FRED HENCK

FOLLOWING a number of meetings of the USITA Settlements Committee with Bell System representatives, the United States Independent Telephone Association announced March 31 that an agreement has been reached that will provide the Independent telephone industry an interim annual increase of approximately $10,000,000 in message toll settlements based on 1960 traffic volumes, assuming all companies were utilizing average schedules. Since a number of Independent companies are settling on other bases, USITA estimated the adjustment will provide an increase of approximately $7,000,000 over-all for companies using 1959 average cents-per-message schedules.

The interim increase will be applicable for a period of one year during which a nationwide study of the cost of "A," "B," line haul and automatic ticketing will be undertaken jointly by the USITA and the Bell System. The average schedules will be adjusted to the results of the study upon its completion.

According to USITA, line haul settlement arrangements have been changed from a "per message" to a "per circuit" basis to simplify administration of the schedules in recognition of WATS and other toll traffic using the message toll network. USITA stated this revision in the line haul schedules could produce approximately $2,000,000 in added line haul settlements as additional interexchange facilities are provided by Independent companies to meet expanded service requirements.

The new settlement arrangements became effective with the bills beginning April 1, 1961, provided that an Independent company accepts them within 30 days after offered by its connecting Associated Bell company. An illustrative traffic agreement embodying these changes will be distributed in the near future by USITA.

The revised settlements schedules include an element to recognize participation of Independent telephone companies in terminating inward WATS traffic. Settlements for WATS traffic originated by customers in Independent territories may be based on the interim settlement plan. The application of the increased interim "A" settlements assumes that Independent companies will participate in the provision of WATS. In future studies to determine the level of settlements, WATS minutes of use will be treated in the same manner as message toll minutes of use.

In announcing the agreement, USITA recommended that Independent companies join with the Bell System in the provision of WATS, both interstate and intrastate. It is understood that the Associated Bell Companies will contact Independent companies promptly, offering settlement arrangements consistent with those outlined in the Joint Report and advising them of the effect of the new settlement arrangements as well as invite their agreement to participate in WATS.

"Telpak"

THE Telpak tariff which the American Telephone & Telegraph Co. has filed with the Federal Communications Commission describes the services offered to customers, and not the physical routes or facilities used

to provide those services, the company has emphasized in answers to questions raised by the FCC staff and the Western Union Telegraph Co.

In a letter to the Commission, AT&T declared that "The distinction between the services furnished, as set forth in our tariffs, and the means employed in furnishing it runs through all our offerings. An obvious illustration is the pricing of private line services, including Telpak, in accordance with airline distances between service points, rather than by the physical route actually used.

"The choice of the route and of the physical facilities is made by the telephone company. We believe this is essential in order to make the most efficient use of plant and to permit prompt furnishing of service. This is true of Telpak services as well as of other services offered by the telephone company."

In both the FCC staff letter and the Western Union petition for an investigation of the Telpak tariff's description of service in terms that "The telephone company will terminate the entire Telpak channel for use as a broadband transmission medium or will provide channelizing equipment to subdivide Telpak channels into channels of lesser width" was relied on.

AT&T responded, in its answer to Western Union, that the section quoted "is a description of the communication services offered under the Telpak tariff and plainly does not purport to describe or in any way govern the physical facilities or techniques which AT&T may use in rendering the service." It also quoted the statement in its private line general regulations tariff that "Channels are electrical paths suitable for the purpose furnished and are derived in such manner as the telephone company may elect . . ."

AT&T commented that "The reservation as to derivation of channels 'in such manner as the telephone company may elect' underlies the design of all private line rate schedules. By pricing uniformly on the basis of airline distances, such schedules avoid rate differentials for identical services which might otherwise occur because of differences in routes and facilities used. Western Union characterizes the carrier's selection of routes and facilities as an 'operational necessity,' at least in so far as its private wire services is concerned. Yet Western Union asserts that the Telpak tariff should be construed as not permitting such necessary practice.

"This construction would limit the availability of Telpak service to the public. Many persons who can be provided Telpak service under a proper construction of the tariff would be denied service under the cease and desist order sought by Western Union.

"The question presented is one of the correct construction of the tariff. The meaning given the tariff should be that which the words carry to the general public to which they are addressed. Any ambiguity or reasonable doubt as to meaning should be resolved in favor of the public and against a technical or restrictive meaning. Resort to this principle is unnecessary, but clearly its application to the Telpak tariff would require that the strained construction urged by Western Union be rejected . . ."

AT&T's answer to the FCC, regarding the situations described in the Commission letter in which a customer requests service over a diversity of routes, with or without specifying the actual routes, agreed that "there is no provision in our tariff under which a customer has the right or option to obtain diversity of routing or facilities on request, with or without additional charges.

"However, in the interest of national defense, special arrangements are made to meet specific military requirements. In such instances, the tariff mileage charges are computed separately for each route in accordance with the service points specified. As (the FCC letter) points out, charging for mileage in this manner is in accordance with our tariff. In this respect, Telpak is not different from our private line tariffs. In all other cases, the telephone company selects the routing and facilities and renders the service in the most economical and practical manner.

"In applying the Telpak tariff . . . there will be situations in which the most economical method of providing service will be to make use of available derived channels over several different routes or facilities. Such diversity cannot, however, be assured in any particular case and occurs, not in response to a customer request, but only as a result of the most efficient utilization of plant facilities by the telephone company."

Regarding the third situation described by the Commission, in which derived channels equivalent to a broadband channel are ordered for Telpak service but are actually furnished over a variety of routes or facilities, AT&T pointed out that "Service requirements, of course, exert important influences on the design, planning, and provision of facilities. Telpak services have already influenced, and will continue to influence facility planning so that, as time goes on, the physical layouts will tend to confirm to the Telpak service arrangement."

GSA Claims FCC Should Request SAGE Rates

THE General Services Administration has asked the FCC to issue a declaratory ruling that rates for the entire SAGE system of air defense, including the type 112 key systems over which a dispute as to jurisdiction exists, are interstate and should be regulated by the Commission.

GSA declared that under section 221(C) of the Communications Act, the FCC is empowered to classify the property of wire telephone carriers, and determine which of it is considered to be used in interstate and foreign service.

It asked the FCC to classify all communications equipment used in the SAGE system, including the key equipment, as interstate or foreign, and to require the American Telephone & Telegraph Co. and its connecting and concurring carriers to file with the FCC tariff schedules for the internal equipment. — *Roland Davies and Fred Henck.*

A TELEPHONE ENGINEER AND MANAGEMENT

REPORT

ON CONSTRUCTION

Getting the Most from Your Construction Dollars

HOLDING THE "COST LINE"

This year the U. S. telephone industry will spend nearly $3 billion dollars for the expansion and improvement of communication facilities. The new types of tools and equipment described by this article have been created to help telephone companies "hold costs down."

By JOHN S. REED

Technical Editor, "Telephone Engineer & Management"

TELEPHONE organizations are in the midst of big expansion programs. These activities result in much construction work, all necessary to bring telephone service to new housing areas, place additional wire, carrier, and microwave circuits to take care of the increasing toll usage, and highway building and widening projects which necessitate extensive moving of pole lines and relaying of buried cable and conduit systems.

The annual reports of the telephone companies bear out this increase in the size of construction projects. Billions of dollars are being spent on construction and maintenance projects. Hundreds of thousands of telephones are being installed, millions of new conductor feet of wire and cable are being placed and many more millions of long distance calls are being made. All these involve heavy expenditures for labor and materials. Labor saving methods are needed to hold in check at least some of these costs. This article will cover construction methods designed to reduce these costs.

"Holding the Cost Line"

A RECENT article relating to the moving of telephone lines as the result of highway widening and relocating tells how cost reductions have been achieved by use of labor saving tools and equipment.[1]

In the area under discussion, the federal, state, county, and local governments are modernizing highway and road systems which often involves widening and relocating of highways or roads and poses a problem to the telephone company and other utilities with pole lines along this route. In a one year period, for example, 230 miles of poles and lines were moved to make way for the relocated or widened highways. Lines were moved as much as 300 feet.

Previously, new poles had to be set and new wire strung. The new pole line was then connected and the old was removed and salvaged. The salvaged material sometimes could not be reused. This rebuilding method was very costly and a new technique was developed to move an existing pole line intact without interrupting service. With the use of trucks equipped with pole moving frames, an entire existing pole line is lifted and moved to the new location.

Trucks with the pole moving frames are positioned to maintain a figure "S" in the wave or moving section holding the wires taut to prevent trouble cases from wires coming together. A "pole skidding" technique for moving poles in a wave over soft ground or on inclines where trucks cannot be used is also employed. The problem of maintaining the proper slack in line wires

[1] *"Yes — We are Holding the Cost Line," by Don Vold, May 1960 issue "Wisconsin Telephone News."*

during the move is solved by using a "slack roller" to control the slack.

After detailed highway construction plans are received from the state highway engineer's office, the necessary engineering work is started for the pole line move. A field trip is made to the construction site. Notes are taken on power company crossings, special equipment that may be required, width and depths of cuts and fills in the highway for telephone wire clearances, joint use with power companies, right of way requirements, and any other information needed to plan the job.

Following the pre-planning, another field trip is made by the engineering people with the construction supervisor to co-ordinate the actual pole move with engineering plans. This is important to minimize any changes that would have to be made later and results in a co-ordinated project. The proposed pole move is checked with power and other telephone companies involved. Right-of-way is obtained and staking of new pole line locations is started.

As staking progresses, frequent changes are made to assure accuracy, since an error can idle men and machines until it is remedied. The wires must be sagged properly between poles to compensate for weather conditions, since the wires might break if the correct sag is not obtained. Following the staking work, the construction work is started with the proper number of men and amount of equipment to accomplish the job.

The pole moving procedures illustrated in *Figures* 1 *to* 5 result in considerable cost savings. For example, a pole line which would have cost $20,500 to rebuild was moved intact for $6,100, a savings of about 70 percent on this job. This comparison includes a charge of about $3,500 common to both cases (the cost to provide road clearances and some other additional replacements). Deleting these common charges results in 85 percent savings.

Farm Machines Save Money On Telephone Line Extensions

MANY mutual type telephone groups are still in existance, most of them badly rundown and in need of rebuilding. In such situations, the adjoining commercial telephone companies are in no position to buy out the mutual groups to give the subscribers better service.

It is possible for these farm mutual groups to get practical help from a telephone company in rebuilding their lines at minimum cost to both. In this farmer participation program, the rural residents, aided by company engineering and construction people, build or rehabilitate their own telephone lines, either to obtain additional service or to improve the existing service.

In some cases, the farmers take possession of the line and pay the commercial company switching fees for the service. In other cases, the company purchases the lines and the farmers pay regular rates for rural service. Regardless of who eventually owns the lines, the program is helpful to the farmers. It saves them mileage construction charges which they would have had to pay the commercial company if this company extended the facilities in the usual manner to serve them.

The farmers receive engineering advice on the lines to construct and are advised on the materials to obtain for construction lines. The farmer working groups receive a minimum of direct supervision but consult fre-

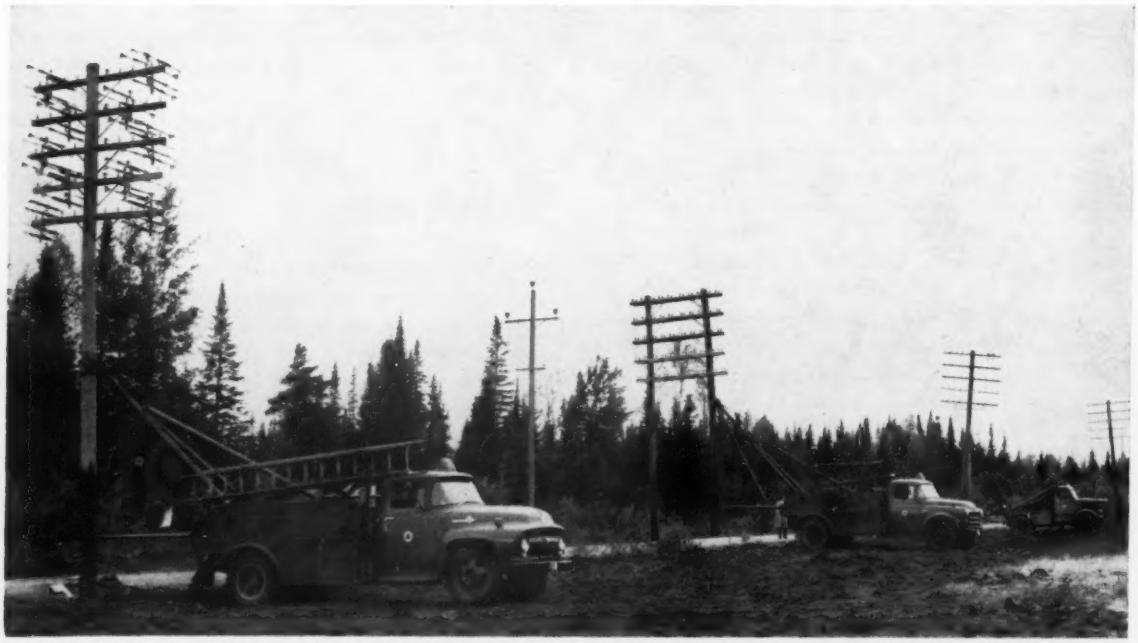


FIG. ONE: — Part of toll lead being picked up by the line trucks equipped with pole moving frames. This shows three trucks being used to move the poles away from the road being widened. (Wisconsin Telephone News.)

quently with the construction foreman assigned to help them. The projects are planned by the telephone company to make use of farm tools and equipment in the project.

In one situation, the farmers made good use of hay lifts to set poles and to raise the men up to crossarms for attaching wires. Most of the workers preferred this method rather than climbing the poles as they felt safer in using the lifts to get up to the wires on the poles. Wire reels were made from truck wheels and axles mounted on the truck bed for unreeling wire being strung on the poles.

If it was necessary to climb the poles, the farmers would use ladders to get up to the wires. To raise the wires to the crossarm or brackets on the poles, they used wood poles with bent nails in the top end for raising the wires. Pole holes were dug by means of farmer built equipment. In one case, a frame was constructed to support an auger from a combine with a truck transmission to run the auger.

This versatile use of farm equipment and tools combined with the excellent community spirit contributed to successful results of the line rebuilding project.

Aerial Buckets for Safety and Economy

THE use of equipment to lift men to telephone wires for working on them brings up the subject of aerial buckets. There is a growing conviction among many companies that aerial buckets have distinct advantages in promoting safety and economy of operation.

The climbing of poles to work on overhead wires or cable is hazardous because of the danger of climbing gaffs cutting out while the worker is climbing up or down the pole and moving around on the pole. The use of a ladder on a pole is not practical because of the need to set up the ladder every time a pole is being climbed. Also, ladders are hazardous unless they can be held securely while the workman is aloft. Ladders cannot be erected out in a span of open wire or distribution wire.

For the tree trimming operations and for working on aerial lines and cables, an aerial bucket increases the safety of the workers. Also, fatigue is reduced by enabling the man to use power tools operated on electric current supplied by outlets in the work basket. Aerial buckets are now available with insulated booms and work basket to enable men to work near power lines without the danger of electrocution.

Economy in using an aerial bucket truck results from having fewer men on the crew. It is possible to employ a two-man crew to do the work of three or four men. Experience with bucket type trucks indicate that this type of truck can place messenger strand and cable with two men in one third to one half the time required by conventional five-man crews.

The use of the truck motor to operate the hydraulic pump for reel loader trailers and the hydraulic boom of the aerial bucket has caused valve trouble requiring frequent tune-up of the truck motors. One company over-

FIG. TWO: — Lineman connecting "slack rollers" to the crossarms of a pole to keep slack in line, reeling wire in or out depending on the way the poles are to be moved. The lineman at the bottom is using a tape line to determine the amount of the movement in the slacking operation. Jumper wires are connected to maintain uninterrupted service during the time the poles are being moved. Line wires are cut and attached to the wire reels on the "slack rollers." A winch line attached to the drums in the center of each roller controls the amount of slack as the trucks move the line. On completion of the move, the line wires are respliced and the reels and jumpers removed. (Wisconsin Telephone News.)

FIG. THREE: — This digger is boring a hole at a stake point. This machine works ahead of the pole moving trucks to enable the poles to be lowered as soon as the trucks arrive at the pole holes. (Wisconsin Tel. News.)

came this problem by using a separate gasoline engine to operate a 5,000 watt, 115/230-volt generator. This generator furnishes power for operating a three horsepower electric motor which drives the hydraulic pump for operating the derrick boom. The engine uses the truck battery for starting and draws its fuel from the truck gasoline tank. The same generator furnishes power for operating tree trimmer tools.

In this manner, the truck motor is used for transportation only and in moving the truck from one pole location to another. When the vehicle is stopped to load reels, step poles, trim trees, and perform other work operations, the truck motor is turned off which means longer operating life and less cost for the truck motor maintenance. The generator can be allowed to run throughout the time the motor and other power equipment operation is needed.

This aerial bucket unit has conveniently located sets of start-stop buttons to operate the electric motor as needed. One set is located in the work basket, another at the reel loader control valves and still another at the motor compartment. The man in the work basket can operate the motor to move the basket as required while working with the cable guide or the cable lashing machine and placing spacers and straps on the cable and messenger at the pole.

To place the cable from the reel trailer guide sheaves of sufficiently large diameter to prevent the flattening of the cable were installed on the truck in the proper locations to facilitate working in the aerial bucket and at the same time, reduce interference with the operation of the boom.

It is expected that this successful use of aerial buckets on cable placing jobs will result in an increase of this type of equipment among telephone companies.

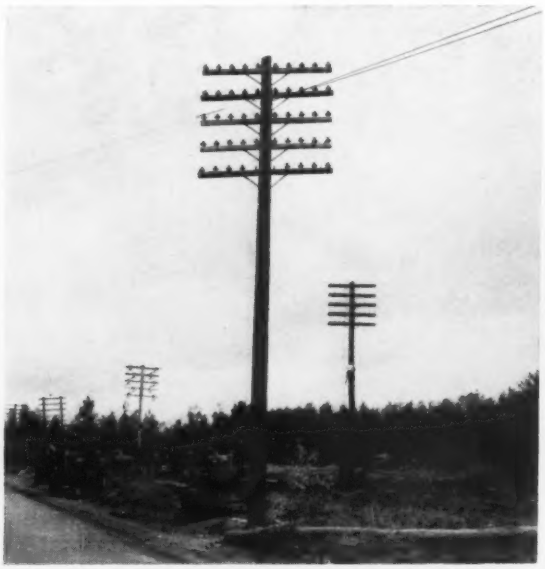


FIG. FOUR:—In this section of the toll lead, pole moving frames are not used. Instead, each pole is lifted out of the ground and set on a trailer which is then pulled by a truck to the new location. (Wisconsin Telephone News.)

Helicopter Speeds Mountain Construction

THE "whirlybird" recently proved its worth in a difficult construction project involving the building of a pole line in Big Cottonwood Canyon about 15 miles southeast of Salt Lake City. A helicopter (*Figure* 6) was used to distribute poles along a 3½ mile line, most of it on the sides of the rugged Wasatch Mountains. This method of installation had been used in other cases for setting single poles in isolated and inaccessible locations. In this instance, however, a helicopter was employed to place poles along a major lead.

A contractor was employed for placing the poles by helicopter. With a two man crew and the pilot, six hours of actual working time were consumed in placing forty-six poles at the survey stakes by means of the helicopter. It is estimated that this method of pole delivery resulted in cost savings of about 25 percent over the customary method of construction in mountainous locations. Another reason for using the helicopter service was that the United States Forest Service officials did not wish to disturb the primitive aspect of the canyon because it was located in a national forest area. This requirement ruled out the building of access roads for transporting poles, wire and other equipment to the sites and made it necessary to route the line close to the mountains, sometimes on the sides of them.

Road Built Across River To Lay Cable

A TELEPHONE company project called for laying six lead covered cables, each four inches in diameter in the bed of the Mississippi River near Minneapolis, Minnesota. For adequate protection, the cables had to be buried in the bed of the river.

A power shovel was employed for this purpose. As it dug the underwater trench for the cables, it built its

FIG. FIVE: — Another method of moving the poles is shown here. This is called "pole skidding" and is used in locations where water, marshy ground, or steep grades are encountered. The three pole skid device is set along side the pole to be moved. When the pole is pulled out of the ground, it is lashed to the vertical pole of the skid and a winch line attached to the front end of the skid pulls the pole to its new location.

own roadway. Both the roadway and the trench progressed side by side across the river as illustrated in *Figure* 7. Sand scooped from the trench was dumped in the river at the end of the road, thereby making the road grow steadily out into the water.

When the trench reached midstream, the digging was halted and the power winch on the opposite shore pulled the cables across the river.

Barrels fastened to the cables as shown in *Figure* 8 floated them across and when the cables were completely over the trench a diver cut the barrels loose to lower the cables into the trench. Then the trench was filled to bury the cables as far out as midstream. This backfilling operation was performed by having the shovel move back to the shore on the roadway that it had built. The shovel then moved out again towards midstream scooping the road back into the trench as it proceeded. Eventually the shovel was on a small island in the middle of the river. It continued on to the far shore building the roadway and digging the trench towards the shore.

When the digging resumed, the cables had been buried as far out as midstream but were on the river bed the rest of the way across. This unburied part of the cables had to be pulled slightly to the side to be out of the way of the digging operation. When the final half of the trench was completed, the remaining lengths of cable were shoved into the trench and the trench backfilled to bury them.

By handling the trenching work in two stages, the damming of the river by the roadway was avoided.

The Construction Lineman — A New Breed

AS THE result of developments in construction methods and equipment, and the need to reduce labor costs, lineman crews are no longer large groups of tough and reckless men, who dug holes and set poles by sheer brawn. These pioneer linemen were part of a hardboiled lot that did the heavy work under the direction of a bull-voiced foreman who did all the thinking.

The present linemen operate in two or three-man crews. Each man has to learn to understand drawings and orders that specify the work to be done.

The new breed of lineman has power tools to supplement his muscular power. He now uses electric drills and impact type power tools in working on the poles.

As a factor in economy of operation, telephone linemen have learned the importance of safe working habits. The company and the supervisors train the men in safe working procedures. The most important factors in the safety to the new breed of linemen is adequate protection of work areas from vehicular traffic and proper precautions in working near power lines and placing wires and cables. The new types of tools and equipment described in the article also contribute to the safety of the men working with them since they reduce the chance of strains and sprains and make it unnecessary for them to perform hazardous work operations formerly considered necessary. — *John S. Reed.*

FIG. SIX: — Helicopter carrying pole to be set in a remote and inaccessible location where pole line is being constructed. (The Monitor, Mountain States Telephone & Telegraph Co.)

FIG. SEVEN: — A power shovel is being used to build its own road across the Mississippi River in a cable laying project. (The Northwestern Bell Magazine.)

FIG. EIGHT: — Cable lashed to empty drums for floating across the river in cable laying project. (Northwestern Bell Magazine.)

A TELEPHONE ENGINEER AND MANAGEMENT

REPORT

ON MAINTENANCE

Maintenance Procedures That Eliminate Trouble Reports

PROPER CARE AT MINIMUM COST

A sound maintenance program consists of the proper amount of preventive maintenance coupled with corrective maintenance for proper and effective care of telephone plant at minimum costs.

By RICHARD ALLEN

A LARGE amount of time and trouble is expended by telephone companies to record cases of faults occurring in outside telephone lines, subscriber apparatus, and central office equipment. As every plant man knows, trouble reports are an important means of obtaining a record of complaints by telephone subscribers on service conditions and measures that were taken to correct the faults. Without a daily log of troubles and periodic summaries of the fault cases, which are reviewed by managers and other interested officials of the company, there would be no way for them to know how the telephone service is standing up, how well the equipment is performing, and how satisfactory the relations of the telephone company employes are with the subscribers.

The condition of the telephone plant is gauged by the number of complaints from subscribers. The better the plant condition, the fewer would be the number of complaints from subscribers. Although it is not true that all trouble reports could be completely eliminated, it is possible to reduce them to an absolute minimum if the telephone equipment is kept at peak operating efficiency.

It is possible to go to the other extreme and make a fetish out of maintenance work, thus incurring costs all out of proportion with the results obtained. Excessive maintenance can be just as bad as inadequate maintenance. Prudent telephone managers are well aware of this fact and try to strike a happy medium.

For adequate maintenance at minimum costs which will reduce trouble reports to a minimum, a good telephone plant maintenance program is needed. Such a program involves the care of outside plant including open wire and cable facilities, subscriber's station apparatus, and central office equipment.

A logical basis for the plant maintenance program requires that all work on outside and inside plant be performed at minimum cost with maximum results. The important thing to keep in mind is that good service is essential for good subscriber relations. However, the telephone company could go too far with its maintenance effort and incur high expenses which would drastically cut into the telephone revenues. This, of course, is undesirable.

A sound maintenance program consists of a judicious amount of preventive maintenance coupled with corrective maintenance for proper and effective care of telephone plant at minimum cost. Preventive maintenance is a routine procedure for locating and correcting conditions which may cause decreased plant efficiency or service interruptions before they actually occur. Such a procedure saves money by taking care of incipient trouble before it develops to the point where emergency repairs must be made at a cost that is not anticipated and provided for. Corrective maintenance is simply a procedure for locating trouble in wire and

PRODUCT DEPENDABILITY *is built into* PD

Phelps Dodge Direct Burial Telephone Wire & Cable!

In every Phelps Dodge direct burial telephone wire and cable, dependability of product is recognized as the first requirement for satisfactory service.

Phelps Dodge achieves product dependability by combining years of manufacturing experience with the most modern research and development facilities throughout its fabricating process. This controlled method of building in quality *during* manufacture assures customers reduced maintenance costs and trouble-free service—important advantages that only true product dependability makes possible.

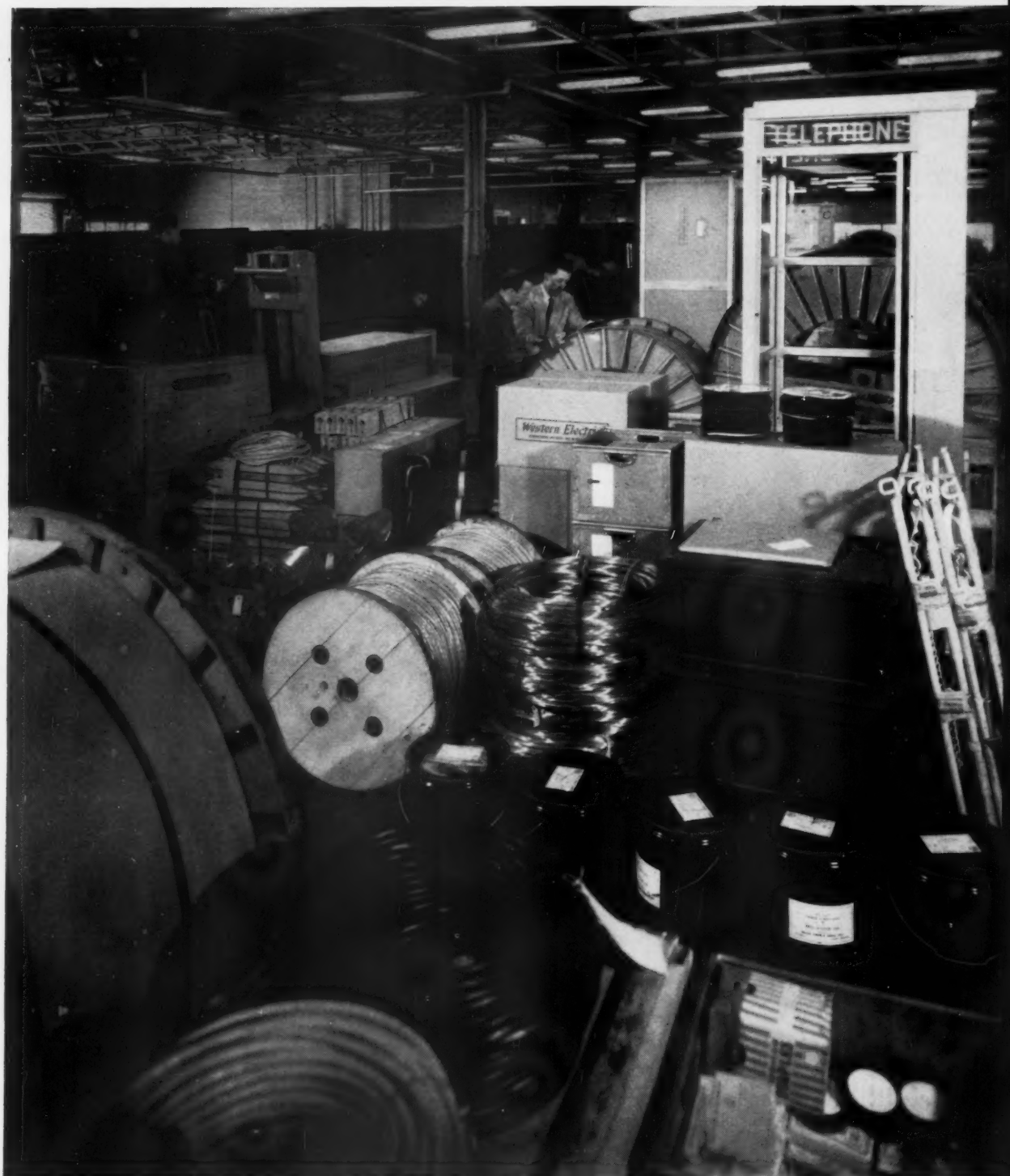
Phelps Dodge will gladly help you fill your direct burial wire and cable requirements and recommend the correct constructions to fit your needs. Just call your nearest Phelps Dodge sales office.

PHELPS DODGE COPPER PRODUCTS CORPORATION

SALES OFFICES: Atlanta, Birmingham, Ala., Cambridge, Mass., Charlotte, Chicago, Cincinnati, Cleveland, Dallas, Dayton, Denver, Detroit, Fort Wayne, Greensboro, N. C., Houston, Indianapolis, Jacksonville, Kansas City, Mo., Los Angeles, Memphis, Milwaukee, Minneapolis, New Orleans, New York, Philadelphia, Pittsburgh, Portland, Ore., Richmond, Rochester, N. Y., San Francisco, St. Louis, Seattle, Tampa, Washington, D. C.

PHELPS DODGE COPPER PRODUCTS CORPORATION PD

WESTERN ELECTRIC AND



AROUND THE CLOCK, everything from thumbtacks and tiny transistors to switchboards and telephone booths flows into Western Electric's supply channels for the Bell Telephone System. Shown on a shipping platform are just a few of the many thousands of items that W.E.'s 33 distribution centers keep constantly on hand for the local Bell telephone companies.

LOGISTICS

As specialists in logistics — the art of assuring the right products, materials, supplies, at the right place, in the right amounts, at the right time — Western Electric helps meet the requirements of the Bell telephone companies in providing reliable, ever-improving telephone service.

Western Electric, as manufacturing and supply unit of the Bell System, is organized to provide whatever the Bell telephone companies request, on a daily basis or a long-range basis, to fulfill the communications requirements of their subscribers.

This is a logistics task that requires the closest integration of Western Electric's plants, distribution centers, transportation companies and nearly 40,000 suppliers located throughout the country. By its nature, it is a large and complex operation encompassing almost every item used in the vast nation-wide telephone network.

To manufacture or obtain this equipment and transport it wherever it is needed, exactly when it is needed, calls for an organization fluidly adjusted to the ever-changing needs of the Bell telephone companies, who are constantly at work finding ways to improve their service.

As examples of the scope of its logistic role, Western Electric will in an average year:

- Manufacture miles of wire and cable, countless switching units, electron tubes, and thousands of other items, each varying in number from one to many millions.
- Purchase over $1¼ billion worth of materials and services from nearly 40,000 different suppliers — 90% of whom are classified as "small businesses."
- Distribute to the 23 Bell telephone companies nearly 25 million items a year through our 33 strategically-located distribution centers.
- Install central telephone office switching equipment at 67,000 separate jobs in 7,200 cities and towns throughout the country.
- Ship products and supplies via 400 railroads, 3,600 truck lines, 60 air lines and 30 water shipping companies.

This extensive logistics experience, coupled with our close association with the other members of the Bell System — Bell Telephone Laboratories and the Bell telephone companies — has also made Western Electric uniquely fitted to head-up communications-oriented defense tasks for the U. S. Government. These have included responsibility as prime contractor for DEW Line, SAGE, White Alice, and the communications aspects of BMEWS.

Western Electric

MANUFACTURING AND SUPPLY UNIT OF THE BELL SYSTEM

EMERGENCY SUPPLY program includes standing arrangements with U. S. carriers to facilitate instant shipping of materials when disaster is most likely to strike. Above, telephone supplies from a Western Electric supply center are air-bound for a hurricane-devastated area.

LST DELIVERS THE GOODS to an Arctic beach. This ship was one of many that raced against time to bring supplies to the DEW Line. Western Electric was prime contractor for this vital defense communications system which guards the United States from the Far North.

TELEPHONE SWITCHING FRAMES, like this one being installed in a Bell telephone central office by Western Electric personnel, are scheduled through manufacturing and shipping to arrive at central office locations — ready for installation — exactly on the dates they are required.

equipment and correcting the condition that produced the fault.

Preventive maintenance can be handled on a routine basis during working hours. When such work is assigned as part of a combinationman's daily work, along with other assignments, such as the installation of telephones it can result in good service to subscribers at minimum cost.

This kind of preventive maintenance work should be supplemented by periodic routine tests and inspections, and repairs of telephone plant. Periodic maintenance work is important chiefly in that it takes care of incipient trouble cases that may be overlooked in the course of daily work of combinationmen. Some parts of the outside telephone plant may never be visited by plant workers in the course of their work because they are in remote areas. This is particularly true of rural exchanges which are often extensive in size.

The plant should be maintained only to the extent where reliable service will result. There are items of plant which may be obsolete but still in good condition, and such items should not be replaced merely because they are out of date.

An example of such an item is a pole bracket with porcelain knob for deadending a drop wire on a pole. If the bracket is still holding the drop and will continue to do so in a satisfactory manner, it is obvious that it should not be replaced by a drive hook. In a like manner, old style glass insulators should not be replaced with a new type insulator as long as transmission requirements are met and the insulator is not broken to the extent of increasing line leakage in wet weather.

Switchman using test equipment to check operation of step-by-step switches in a periodic routine.

At the outset, a standard preventive maintenance program may be set up. Adjustments can then be made in the program of periodic inspections and maintenance by omitting or adding certain routines as needed until analysis of trouble reports show a satisfactory minimum of such reports at minimum operating costs.

The company can establish its own inspection require-

Switchman trainee learning how to adjust mechanism on a selector switch in a central office training school.

Switchman in training school using a routiner to check operation of a linefinder switch he has adjusted.

Central office equipment man making a routine operation test of linefinder equipment.

Switchroom employe cleaning tops of switch covers to remove dust. Proper cleaning routines are important to keep dust out of relay and switch contacts.

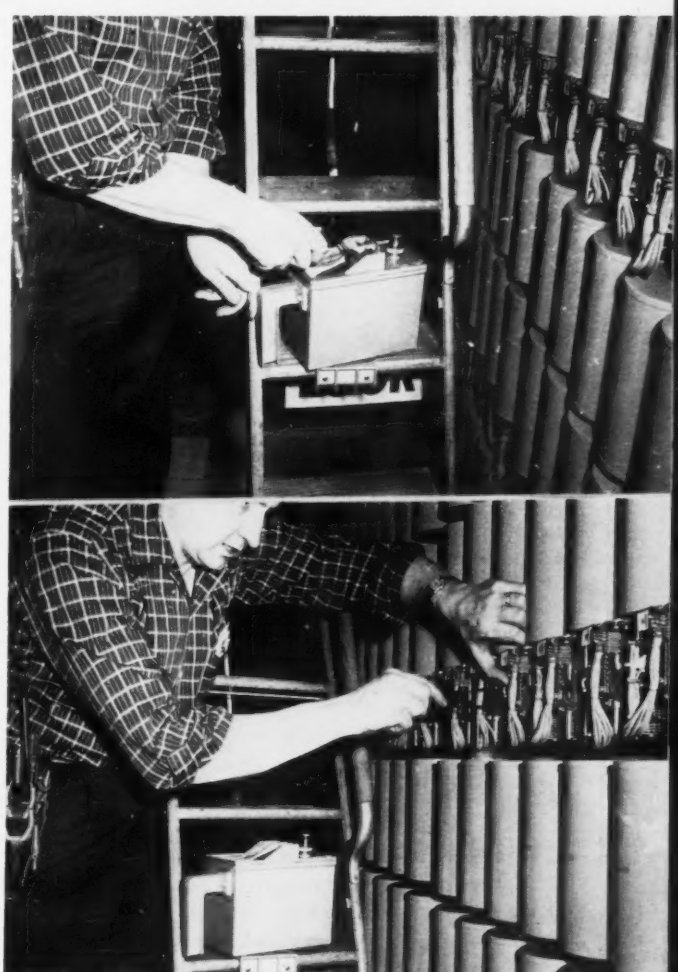
ments to be followed in daily work by combinationmen and in periodic inspections by a supervisor with assigned plant workers. In the periodic inspections, it is very important to have a competent man make the inspections. Often the manager himself is best qualified to handle this important work since he is cost conscious and has a good basic judgment for determining whether replacement of plant items should or should not be made.

Daily Inspections Of Outside Telephone Plant

TO OBTAIN the maximum results from daily inspections, the plant people should be trained in the method of making the inspections. They should know what defects to look for and how to correct them. The importance of reporting unsatisfactory plant conditions that cannot be corrected on the location should be stressed. These men should be provided with a standard form on which to report these plant conditions. This form varies from company to company, but regardless of how it is made up, it has the primary function of reminding the plant worker to report defective line conditions that should be corrected when he cannot do the work himself.

It has been found that the provision of a blank pad of paper for recording the conditions to be corrected will not do the job. The man must be told in specific terms what to report, what information to give for making the correction of the defective plant condition, and whom to give the report to. It is a good idea to provide a holder attached to the dash board or steering column in the combinationman's truck for retaining the pad of form sheets.

The report form is also important for recording situations that may require plant rearrangements and changes such as houses being built near the telephone



Central office equipment man using bank contact cleaning equipment to clean bank contacts on step-by-step switch. Top — Picking up cleaning solution on cleaning tool. Bottom — Using cleaning tool on bank contacts.

"Maintenance Procedures"

(Continued from page 41)

line and power lines being erected in the vicinity which may cause clearance difficulties. Roads may be observed being relocated or widened, requiring the moving of telephone lines. Other construction work may be noted which would affect the lines in the vicinity.

Typical conditions that the plant worker should look for in his daily inspection would be tree foliage growing into open wires, tree branches growing out above a telephone drop and which could break off and fall on the drop, breaking it, debris on telephone wires, and anchors settling at line corners, causing the guy to give and create sags in the line wires.

The following are items of open wire plant that should be looked for in the inspection and corrected:

(1) Broken insulators.
(2) Defective splices (use compression type sleeves).
(3) Loose ties.
(4) Bad pins, brackets, or crossarms.
(5) Missing or loose nuts on crossarm bolts.
(6) Missing or unfastened crossarm braces.
(7) Loose connections of bridle wires to line wires.
(8) Inadequate clearance over roads, driveways, etc.
(9) Insufficient clearances from power or other foreign wires.
(10) Slack or broken guys or anchors.
(11) Uneven or excessive slack in line wires.
(12) Badly rusted wires.
(13) Missing or improper types of buffer protector blocks and poor or missing protection grounds.

Periodic Inspections Of Outside Plant

THE periodic inspection is similar to the daily inspection except that it is made by a qualified inspector and the inspection is more detailed. A list of defective plant items is made up as the inspection progresses, using the same check list given for daily inspection. Poles are climbed when a closer examination is judged to be necessary.

In addition, an inspection of the line poles may be made. In the case of a lead that has been rebuilt, the initial inspection is made 10 years after the poles are set; since a few treated poles may fail after this period. Subsequent inspections are made every three to five years to catch additional defective poles. (Experience indicates that after the few defective poles are replaced, there will be fewer and fewer poles failing because of decay and a long service life will be realized from the poles in the lead.)

In the case of aerial cable plant, a walking and climbing patrol is made to check for the following defects:

(1) Holes in cable sheath (to be repaired by soldering over or by placing sleeves).
(2) Unsupported splices or cable, damaged, corroded or slipped cable rings (Preferably lash the cable to the messenger).
(3) Loose cable lashing wire, loose lashing wire clamps, and missing cable spacers. (Loose lashing wire can be retightened by rapping on the messenger and at the same time pulling up the wire.)
(4) Broken face plates in terminals, bad terminal posts, and missing or damaged cover.
(5) Protectors at open wire junctions for missing, operated, or improper type blocks. Correct these conditions. (Buffer protection inspection is handled under open wire.)
(6) Dead drops from cable pairs to be disconnected and taped back neatly.
(7) Inadequate clearances from power wires or conditions tending to create power arcs.
(8) Grounded and shorted cable pairs to be cleared and these pairs restored to service.
(9) Messenger grounds and bonds not in place. (Missing bonds to grounding conductor of multi-grounded neutral are to be placed.)

Corrective Maintenance

MENTION was previously made of corrective maintenance. This term would refer to the locating and correcting of defective conditions that have resulted in failure of one or more of these items. Corrective maintenance differs from preventive maintenance in that the work is done after the particular item fails to function in the normal manner. Such functional failure may result in a service interruption and is usually detected through a subscriber report or operation of a central office alarm. Sometimes a routine test may detect the presence of a functional failure before it is reported through a subscriber complaint. Line noise may be an example of such a functional failure detected by routine tests and which may not have disturbed the subscriber to the extent that he feels he must report it.

Corrective maintenance cannot always be avoided and such work must be promptly handled to avoid poor subscriber relations. Excessive corrective maintenance is indicated by a high number of trouble cases which is a sign that preventive maintenance procedures have been insufficient. In general, trouble cases should not exceed three or four per 100 stations each month under normal conditions.

Inspection & Maintenance Of Drop Wire & Station Equipment

WITH the improvement in the quality and durability of drop wires and station instruments, a periodic inspection of the drops and instruments on the subscriber premises would not be economical. Drop wire may be included in the daily inspection of outside plant where the combinationman would not have to leave his truck for a detailed inspection.

However, it is possible to establish routine tests of telephone lines from the central office at certain intervals to determine leakage resistance, shorts, crosses, opens, and grounds. Such tests need to be done only as often as experience indicates to be desirable. This test will indicate any trouble condition that may be coming on or detect actual trouble cases.

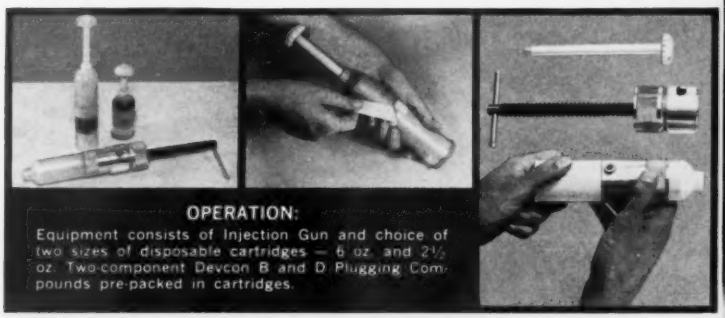
After clearing any trouble cases found on the office side of the line, cases of outside trouble may be accumulated and a combinationman assigned to clear the faults along with other work that he may be assigned. By careful planning, trouble cases

NEW DISPOSABLE CARTRIDGE METHOD

STOPS CABLE PLUGGING PROBLEMS

Safe · Quick · Easy · No Cleaning
No Skin Contact
Use B and D Compounds

Save time in mixing epoxy resin and activator. Eliminate any cleaning of gun. B COMPOUND is recommended for plastic insulated cable while the D COMPOUND is applicable for paper insulated cable. Both B and D resins are available in 6 and 2½ ounce cartridges. The LD-755 Gun has a lifetime warranty.



OPERATION:
Equipment consists of Injection Gun and choice of two sizes of disposable cartridges — 6 oz. and 2½ oz. Two-component Devcon B and D Plugging Compounds pre-packed in cartridges.

1. Remove tape clinch band from cartridge.
2. Rotate dasher rod until material is completely mixed.
3. Remove dasher rod and insert cartridge in Injection Gun for application.
4. Attach fitting to cable and eject resin.
5. Remove cartridge from gun and discard.

Patent No. 2,838,210 (others pending)

Send me complete instructions and prices.

Name _____

Company _____

Address _____

City _____ Zone ___ State _____

The next time you order, SAVE TIME, SAVE CONFUSION

DIALINDSAY SERVICE

LINDSAY TELEPHONE SUPPLY COMPANY

360 EAST HIGHLAND RD.
NORTHFIELD, OHIO
Telephone: IMPERIAL 7-7181

•

590 PIEDMONT AVE., N. E.
ATLANTA, GEORGIA
Telephone: TRINITY 5-7091

CALL US COLLECT, PLEASE!

Bury your maintenance costs with Anaconda PCP and PCPG cables

Direct burial offers many cost-cutting possibilities – (1) freedom from storm damage, (2) freedom from tree-clearing and retrimming expenses, (3) freedom from the hazards associated with power contacts and pole climbing, (4) freedom from right-of-way procurement difficulties.

Anaconda PCP and PCPG cables offer you *extra* cost-cutting features. Here are a few of them:

1. Outstanding resistance to lightning damage – a copper shield and a high-molecular-weight polyethylene belt over the core make the over-all cable highly resistant to lightning damage. The high-molecular-weight polyethylene conductor insulation protects against conductor-to-conductor lightning damage.

2. Water vapor will not cause failure – because of the excellent moisture resistance of the high-molecular-weight polyethylene insulation.

3. Full color coding – makes for low-cost installation by fast, easy splicing and terminating. Eliminates test splicing. All it takes is a one-man crew. And – all these advantages are repeated every time you add or change terminals.

4. Easy handling – this lightweight cable with its rugged corrugated shield permits easy handling during in-

stallation, plowing, and burial.

Should you select PCP or PCPG?

The difference between Anaconda PCP and PCPG cables is a difference in thickness of the corrosion-resisting, low-resistance copper shield. PCP cable, having a 0.005-inch shield, is intended to withstand attack by termites and small rodents, such as field mice. PCPG cable, with a 0.010-inch shield, is for use in areas where gopher attack is a possibility.

Find out if direct burial of Anaconda PCP or PCPG cable can help you reduce your operating and maintenance costs.

Call your nearest Anaconda district office direct. Or write: The Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.

60245

PHONE THE MAN FROM

ANACONDA®

FOR PCP AND PCPG TELEPHONE CABLE

the independent manufacturer
for the independent telephone industry

can be cleared with the minimum of driving time.

In working on a trouble case, the combinationman should also inspect the drop wire, outside station protector, station ground and all associated connections.

The drop wire inspection should include the following:

(1) Loose connections at the point where the drop wire connects to the line wire, cable terminal posts, or outside station protector.

(2) Damage or weather deterioration of the drop wire installation.

(3) Drop wire slipped in clamp at the pole and house.

(4) Unsatisfactory routing of drop wire.

(5) Insufficient sag in drop wire, making the wire too tight at its supports.

(6) Insufficient clearance from trees. (No attention need to be paid to light whipping of the wire from branches.)

(7) Loose or broken "S" or "C" knobs or insulated screw eyes.

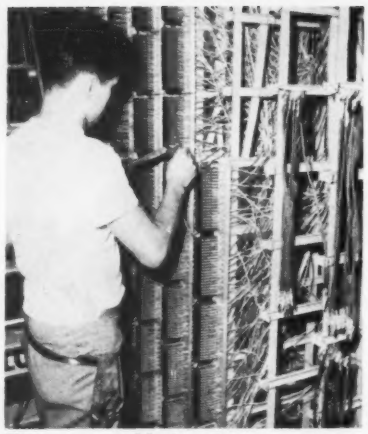
Inside the subscriber's residence, the inside wire run should be checked and damaged parts repaired; also, loose places should be refastened with suitable fasteners.

The telephone instrument is next checked by removing its housing and examining the interior elements and terminal assemblies. All screws are tightened including terminal post screws and mounting screws.

The handset with transmitter and receiver is checked for condition of these elements. Dirty transmitter mouthpiece and receiver cap are cleaned. The cord may require unkinking or if it is worn, it should be replaced.

The set's dial should be tested for proper dial speed by dialing a test number to obtain test tones indicating the speed, or by having the testboard make the speed check. The dial may be readjusted on the premises or else replaced with a good unit. Lubrication is seldom practical except in the shop, as only the proper kind and amount of oil can be applied there.

The cradle switch of the set should operate satisfactorily. Sticky plungers will require cleaning. Spring contacts may be cleaned with strips of hard-finish paper. If the contacts are quite dirty, a strip of lint-free cloth folded over a burnisher blade and wetted with a little chloroethene may be used to wipe away dirt and grease. The burnisher blade may be used to smooth down burrs and pits in the contact metal.



Frameman soldering jumper connections on line intermediate distributing frame. The proper soldering method is vital to prevent future trouble.

If the set ringer does not operate satisfactorily, look for line or station wiring faults such as a high resistance joint or poor connection, or a ground contact on the line. If these faults are not present, adjust the ringer for better operation.

Bell tapping from another subscriber dialing on the same line is usually the result of improper connection of the ringer leads. If reversing the leads will not correct this condition, tighten the biasing spring or increase the spacing between the clapper and the gongs, or both.

Frequency tuned ringers are properly adjusted in the factory to operate on their designated frequency and should work satisfactorily. However, if it should be necessary to make adjustments, loosen the gong screws slightly and move the gongs out to their farthest positions with respect to the clapper. Dial the reverting call number. With the clapper vibrating at its maximum swings, turn the gongs in gradually until the clapper just touches the gongs as indicated by a clear ring. Grasp each gong alternately between thumb and fingers to muffle it. Each gong should emit the same ringing volume of equal clarity. When the gongs are satisfactorily adjusted, retighten the screws.

On completion of the station check, the inspector should call the testboard for transmission and ringing tests.

Central Office Maintenance

AS IN the case of outside plant, the C. O. maintenance program includes both preventive and corrective maintenance procedures. Here again judgment will have to be exercised as to the best procedures to follow. The size of the operating company and its resources are important factors in the selection of the proper maintenance routines. Obviously, it would be quite costly to have an elaborate maintenance set up with a large working force.

The first and most important factor to consider is the training of central office personnel. The men in this group should be capable of performing the necessary maintenance routines. They should have a working knowledge of electrical principles and their applications to relays, magnets, and switches. They should understand the operation of dial switches (linefinder, selector, and connector), use of trunking systems, and power equipment operation. They should be capable of adjusting relays and switch mechanisms.

If the company does not have the resources for training their own employes, it can send the men to an outside training school. Manufacturers provide schools for training operating company employes in basic fundamentals of dial switching systems. It is well worth the expense of sending the men to a school of this kind. The return will be even higher after they have been working with the equipment sufficiently long to become more proficient. Their training will become particularly valuable as the company adjusts the work routines to reduce maintenance costs.

In preventive maintenance, standard tests can be set up to detect abnormal conditions of the elements of the switching equipment before service is affected. These tests or routines can be adjusted as experience indicates the feasibility of the changes. Thus a monthly routine might be changed to a quarterly and then a semi-annual basis with records being

kept of trouble reports during the test period. When the number of cases rise, then it is time to back track and readjust the frequency of the routine. A point is finally reached when the routine is stabilized for the minimum number of trouble reports and the most economical operation under that particular routine, with variations as the traffic load in the office fluctuates.

Instead of periodic tests, a system may be set up whereby only tests are made when an actual trouble case occurs, to detect the trend that indicates the action that should be taken to correct the condition. Tests are then made on the particular items that appear in the fault pattern and the causes are eliminated before service interruptions actually occur. Such a set up requires thoroughly trained and competent personnel who are capable of analyzing the fault patterns.

For small dial offices, the following general maintenance procedures are recommended:

(1) At the time the office equipment is installed, have all preliminary tests made in a thorough manner to detect any incipient faults that might develop into serious trouble later on.

(2) Relays and switches must be kept clean and properly adjusted using the proper tools and following the manufacturer's recommended testing procedures for the type and make of the office apparatus. It is important to follow the instructions thoroughly and keep records of the performance of the equipment and troubles that occur. Lubrication schedules should be carefully followed with modifications only as results are observed over a period of time.

(3) Be sure the central office battery is kept fully charged. Perform all tests required and keep a record of specific gravity readings so that the condition of the battery may be observed frequently and any necessary steps taken to correct abnormal conditions. Maintain the electrolyte level at the proper point to avoid loss of battery capacity.

(4) Dust and dirt must be kept out of the building to avoid relay and switch troubles from this source. Filters are not fully effective in retarding dust infiltration, so ventilators should be closed during dusty or wet weather. Excessive humidity can cause serious trouble. Dehumidifiers are helpful and electrical heaters may be employed in cold weather to warm the equipment slightly above the temperature of the surrounding air. This will prevent moisture deposits.

(5) Keep the building and equipment clean at all times. Avoid bringing in dirt and dust. Preferably use treated lintless cloths and mops to pick up dust without causing it to rise in the air to deposit on switches and relays. Cabinet doors should be closed at all times unless the equipment is actually being worked on.

Conclusion

THIS article has stressed economic factors in the maintenance of telephone plant. Overemphasis on maintenance increases the company's operating costs. On the other hand, equipment should not be neglected to the extent where the outside plant looks beaten down and the inside plant becomes dirty and noisy in operation. Careful planning is needed to develop maintenance procedures that reduce trouble reports to a minimum and at the same time keep down operating costs. — *Richard Allen.*

New Reference Books

"Methods Of Artificial Respiration." Prescribes the three manual methods of artificial respiration approved for Coast Guard use — Mouth-to-Mouth Resuscitation (expired air resuscitation) Preferred, the Back-Pressure Arm-Lift Method, and the Back Pressure Hip-Lift Method, either of which may be used in conjunction with the administration of oxygen. 1960. 17 p. il., Catalog No. T47.8:Ar 7, Price 15¢. Order from Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

"Telephone System Construction Contract (Labor And Materials), REA Form 511." Prepared by the Rural Electrification Administration for the use of contractors, suppliers of telephone equipment and materials, and telephone engineers interested in bidding on construction and installation for Rural Electrification Administration borrowers. Rev. 1960. (395) p. ill., Catalog No. A 68.2 T 23/2960. Price $2.25. Order from Supt. of Documents, U. S. Government Printing Office, Washington 25, D. C.

"Contract To Construct Buildings, REA Form 257." Contains various contract forms, including notice and instructions to bidders, bid bond, proposal, acceptance, and contractor's bond. 1960. 18 p., Catalog No. A 68. Form 257. Price 15¢. Order from Supt. of Documents, U. S. Government Printing Office, Washington 25, D. C.

"Policy Planning For Space Telecommunications." A staff report prepared for the Committee on Aeronautical and Space Sciences, to serve as an analysis of the current situation, both national and international, regarding the use and planned use of the radiofrequency spectrum, especially as related to space telecommunications. 1960. 207 p., Catalog No. Y 4. Ae 8: T 23 Price 55¢. Order from Supt. of Documents, U. S. Government Printing Office, Washington 25, D. C.

Introduction To Electronics. Here is presented the story of the electron-a history of the development and use of electronic techniques and instruments. Beginning with a discussion on the evolution of communications, this Army manual presents brief histories of wire telegraphy, telephony, radio, radar, loran meteorological electronics, television, and other electronic devices and systems. 1949. 43 p. il. Catalog No. M 101.18:11-660. Price 35¢. Order from Superintendent of Documents, United States Government Printing Office, Washington 25, D. C.

Electrical Fundamentals (Alternating Current). This Army technical manual presents the electrical fundamentals of alternating current. It covers inductance capacitance, circuits, tuned circuits and resonance, transformers, and other phases of alternating-current electricity. 1951. 231 p. il. Catalog No. D 101.11:11-681. Price 35¢. Order from Superintendent of Documents, United States Government Printing Office, Washington 25, D. C.

I Like
LEICH
• Largest Stocks in the Industry
• 6 Fast-Service Warehouses
• Long-Lasting Supplies
LEICH
GENERAL SYSTEM
Subsidiary of
GENERAL TELEPHONE & ELECTRONICS

Money-makers....

Choose **LEICH'S SUPPLY SERVICE**

Be a money-maker! Order efficient, profitable supplies from Leich.

Leich supplies are made by famous, reliable companies. They last longer . . . help you do your job better. All materials are proved on the job.

Everything we sell is guaranteed.

Another bonus: Six Leich warehouses assure fast delivery. The largest stocks in the industry guarantee the right tools when you need them.

Start making money now! Order your supplies from Leich.

We're at your service.

LEICH SALES CORPORATION • 427 WEST RANDOLPH STREET • CHICAGO 6, ILLINOIS

PACIFIC COAST: 11401 W. PICO BLVD., LOS ANGELES 64, CAL. EAST: 3651 CONNECTICUT AVENUE, YOUNGSTOWN, OHIO

SOUTHWEST: 1227 SLOCUM STREET, DALLAS 7, TEXAS SOUTHEAST: 5126 SOUTH LOIS ST., TAMPA 11, FLORIDA • 2915 W. MOORE ST., RICHMOND, VA.

manufacturers of telephones, switchboards and related apparatus since 1907

A TELEPHONE ENGINEER AND MANAGEMENT

REPORT

ON SAFETY

Work-Area Protection Methods

HIGH LEVEL WARNING TO MOTORISTS

Many telephone construction, repair, or maintenance projects require that certain work operations be performed on or near traveled portion of roadways. Here's a new approach to the problem of informing the motoring public that a work operation is in progress.

By NORMAN J. PHILLIPS*

AT THE present time there are approximately 61 million automobiles on the highways and by-ways of the United States and it is very likely that a substantial number of them are either approaching or leaving one of a variety of types of work operations on or near the travelled portions of their respective routes.

Indeed, the frustrated gentleman on Route #5 no doubt wishes very sincerely that he had taken Route #12 and his counterpart on Route #12 no doubt wishes that he had taken Route #5. On more than one occasion each one of us have had what we felt was sufficient cause to feel that work operations on public highways are nothing less than the end result of a diabolic plot to provide as high a degree of interference with traffic flow as is humanly possible, and it would require a very nimble mind and quick tongue to convince us that this is not so.

Why is this feeling shared by so many motorists? What has brought about this increase in activity on or near our nation's roadways? Will this activity abate, continue or increase?

Certainly each one of us is aware that there will unquestionably be no decrease and in all probability the recent increase in work operations will continue for some time to come. Also, the problem will continue to compound itself due to the ever-increasing number of automobiles travelling our nation's roadways.

The increase in activity is understandable. Nationally we are in the middle of a tremendous highway development program and we are continually improving existing roadways. Building construction programs set new records year after year and each new building record requires that a corresponding record be set in water, sewer, gas, electricity, and telephone service construction programs. Each of these services require that certain work operations be performed on or near a travelled

Telephone cable splicers placing traffic cones and high level warning flag standards to protect their work area.

Mr. Phillips is district construction superintendent of the Pacific Telephone & Telegraph Co., San Diego, Calif.

portion of our roadways, not only in their construction and installation but also during periodic maintenance and replacement activities. Obviously then we cannot alleviate the situation by ceasing our activities on the roadways.

The Problem

TRAFFIC interference is not a problem for the motorist alone, it is at the same instant a matter of concern for the work force performing the work operation that presents the interference. The safety of both the motoring public and the worker performing the operation presents real problems. We are a people with a demonstrated ability to progress. We continually improve our own production performance, and with our abilities we can improve our own safety and the safety of those for whom we are responsible.

Work operations on or near our roadways are necessary and they will continue so. Public travel on our roadways is necessary and will continue so. This does not present an impasse, rather it creates a situation requiring a substantial application of American ingenuity. We are capable of providing that ingenuity.

Early Warning

THE first faltering steps to counter the problem consisted of warning the motorist with a sign during daylight hours and a red lantern during the hours of darkness, normally placed at the work location. This was adequate when the average speed of a motorist was 15 to 25 miles per hour and there were 80% fewer automobiles to contend with. Unfortunately, while technology has swept the automobile forward in its tide, traffic warning skills and devices have pretty well been left stranded on the beach.

Now let us discuss a new approach to the problem of informing the motoring public that a work operation is in progress and a new approach to guiding them through the operation.

Problem Factors

WE MUST recognize that streets and highways serve a threefold purpose: (1) pedestrian traffic, (2) vehicular traffic, and (3) utility services. At the same instant, they will bear both pedestrian and vehicular traffic while beneath the surface and along the sides exist easements for a complicated system of utilities.

It is readily apparent that each of these purposes must be served in the most efficient manner possible. A utility performing a work operation cannot ignore the requirements of the pedestrian and the motorist in their use of the public roadways. With this thought in mind it becomes apparent that production planning alone for each job is not enough if we are to accept the responsibility the work operation places upon us. In addition, we must take the necessary precautions to protect our workman, the pedestrian, and the motorist. We must perform our work in a manner that will provide for a smooth convenient flow of traffic presenting a minimum of interference and inconvenience for a minimum length of time.

Driver of car gets adequate warning of the work area he is approaching and is readily guided into the adjacent lane.

In general, street surface traffic will fall into two broad categories: (1) congested slow moving urban traffic, and (2) high speed freeway or rural traffic. In the residential or business area we find our present streets handling many times the volume of vehicles they were engineered to handle. For example, an intersection designed during the period when a hitching rail and twenty teams of horses were not uncommon, now, by actual count, will handle 17,000 vehicles per day. Even this may not be one of our busiest intersections, but the instant we undertake a work operation it presents every evidence of being the busiest intersection in the nation.

In those areas less developed and in those we commonly refer to as rural, our problems are different but no less hazardous. The modern motorist with 200 to 300 horsepower available while travelling on hard surfaced roads often feels that everything is in his favor and he is soon travelling at or near full speed. Anticipating a work operation around the next corner or over the next hill is a most remote thought in his mind. If the thought should enter his mental picture screen he expects, and rightfully so, that the workmen performing the operation will adequately warn and protect both him and themselves. Obviously providing this protection becomes the responsibility of the force performing the work operation.

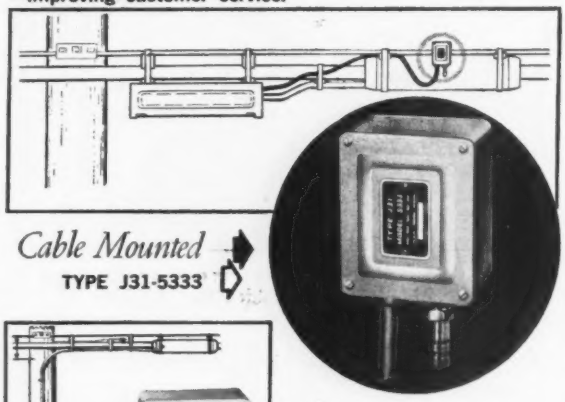
Work Area Protection

NOW let's talk about protection. We know that a vehicle weighing from 3,000 to 10,000 pounds, travelling at speeds of 30 to 60 miles per hour would require a barricade consisting of several feet of rein-

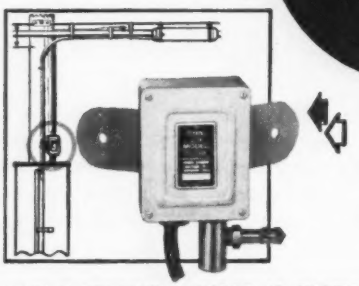
Next page please

Protection for PRESSURIZED CABLE SYSTEMS

with U.E.'s improved, compact Pressure Guard as the proven aid for reducing cable maintenance costs and improving customer service.



Cable Mounted
TYPE J31-5333



Pole Mounted
TYPE J31-5338

WHY A PRESSURE GUARD IS ESSENTIAL FOR MAXIMUM EFFICIENCY IN PRESSURIZED CABLE SYSTEMS

- The Pressure Guard monitors and protects cable at all times, not just periodically.
- The Pressure Guard ensures routine sheath breaks are detected and localized prior to service disruption.
- The Pressure Guard provides one more value that may be detected at the test desk.
- The Pressure Guard transmits its signals via working subscriber lines rather than requiring special circuits.
- The Pressure Guard reduces cable maintenance costs and improves customer service at very low cost.
- The Pressure Guard's low cost permits liberal usage for maximum protection.

SPECIFICATIONS

TYPE J31-5333

Field Adjustment Range	0 to 10 PSI
Factory Setting	2 ±¼ PSI on falling pressure
Pressure Response	4 ±½ oz.
Proof Pressure	30 PSI
Electric Rating	0.01 amp 100 V DC
Load Resistor	Carbon composition 270,000 OHM 1 watt

Drop Wire .....6' Type SJO#18 stranded 2.0 conductor
Pressure connection: ⅛ NPT (⅛ x ⅛ elbow provided separately; usually not required with direct sleeve mounting).

TYPE J31-5338

Same as above with the addition of pole mounting provisions and 6' of copper tubing.

Available through regular suppliers of telephone equipment. Contact them for new Type J31 Pressure Guard brochure. Catalogs covering other UE pressure, vacuum and temperature controls also available.

UNITED ELECTRIC

CONTROLS COMPANY
85 School St., Watertown, Mass.

SUBSIDIARIES

United Electrical Controls (Canada) Ltd.
O'Connell Avenue
Dorval, Quebec, Canada

United Sensor & Control Corp.
Box 127
Glastonbury, Conn.

"Work-Area Protection

(Continued from page 51)

forced concrete to keep it out of the work area. In addition, as automotive design developments have taken place and speeds have changed the automobile from an enjoyable mode of travel to what may be identified as a homicidal weapon, the elevation of the driver's eye level above the street surface has been substantially reduced.

At present, the eye level of our average driver is between four and five feet above ground. When we have our work areas protected with warning devices eighteen inches to forty-eight inches high, the driver of the second and subsequent vehicles in line seldom knows a work operation is in progress until it is too late.

The demand for both utility and construction services has grown so rapidly that many organizations have found it necessary to use inadequate warning devices. Others have taken a panic approach and have purchased devices that have proved inadequate in field trials. The end result of such a problem has not only been unsatisfactory but has served to confuse the motoring public on both the use of and meaning of warning devices.

We must guard our work areas on or near the travelled portion of roadways in such a manner as to provide minimum traffic interference. We accomplish this by warning the approaching vehicle operator in sufficient time to permit him to react to the warning and guidance pattern without unplanned movement.

High Level Warning

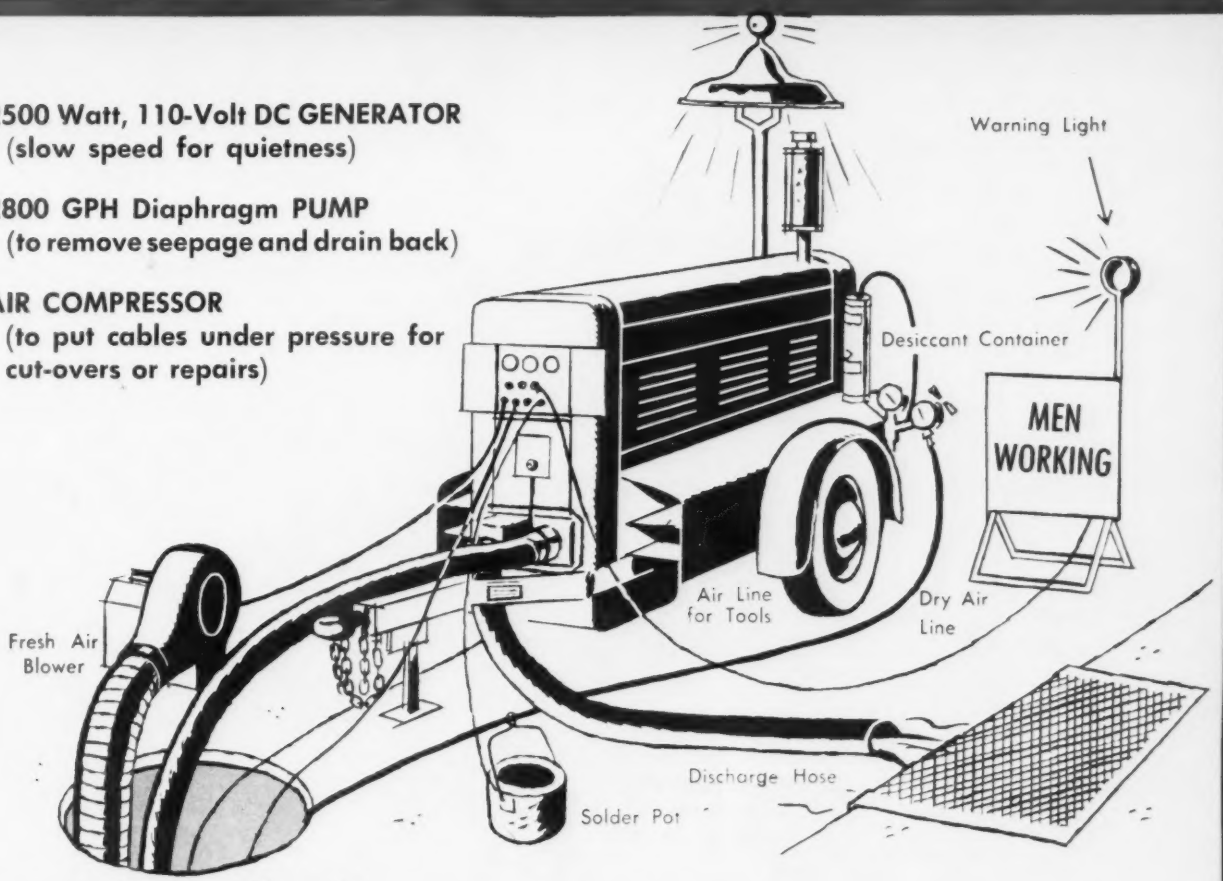
IN CALIFORNIA, utilities are experiencing unprecedented construction programs in both residence, business and industrial expansions. Understandably, this has required a continually increasing level of activity on the part of employes on and near travelled roadways. In order to counter the hazard many of them are using high level warning.

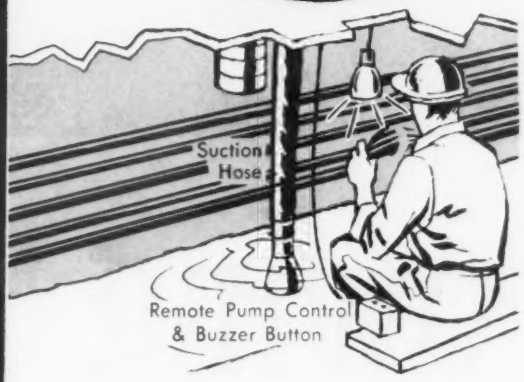
To provide high level warning we have adopted units that permit placing warning flags and lights at elevations up to twelve feet. This permits the driver to see what is ahead in time to plan his proper maneuver. Adequate warning eliminates the need for split second decisions and emergency situations. By eliminating the need for last second decisions we have removed the cause of many accidents in and around the work area. By placing the warning device in view above and or in advance of the obstruction we are able to warn the driver before he enters the hazardous area. In urban areas this type of warning is normally visible for two or three blocks, and in rural areas normally up to half a mile.

The actual location of the high level warning device relative to the work operation can be determined only after carefully considering traffic volume and speed and their relationship to the terrain and roadway

S & G MOBILE POWER UNIT

- **2500 Watt, 110-Volt DC GENERATOR** (slow speed for quietness)
- **2800 GPH Diaphragm PUMP** (to remove seepage and drain back)
- **AIR COMPRESSOR** (to put cables under pressure for cut-overs or repairs)





WHAT ARE MOBILE POWER UNITS?

Designed specifically for telephone company jobs and problems, they are basically a trailer mounted, slow speed (1200 RPM) electric plant — plus a diaphragm pump and air compressor (if desired). They are used by telephone cable splicing crews for lighting (300-Watt floodlight), operating soldering pot and iron, electric and air tools, to ventilate manholes (electric blowers), to supply dry air for cable cut-overs, flash testing, etc., to keep the manhole dry, and to summon helpers (buzzer signal). The units are light, easy to handle, and very quiet in operation.

For full details, write for our Bulletin No. MPU-1-61.

Order Through Your Favorite Distributor — For Information, Write or Phone

S & G MANUFACTURING CORP.

DESIGNERS AND MANUFACTURERS OF

Special Equipment for Utilities and Contractors

1017 MAGAZINE ST. • NEW ORLEANS 10, LA. • JA 5-3142

XY® Dial growing

Installation rate: better than 1 a day

• Among Independents, the XY Dial System is still the leader, and its rate of acceptance is increasing.

Since this switch-operated, step-by-step system was introduced by Stromberg-Carlson just over a decade ago, operating companies have expressed their confidence in it to the tune of well over 3,000 installations. This represents an increase of 33% in the last three years alone, with new installations averaging better than one a day. Here are a few typical reasons for this phenomenal growth:

FLEXIBILITY. Plug-in switches and circuit plates let you expand service without replacing equipment.

MINIMUM MAINTENANCE. Vertical wire blanks collect no dust; save countless troublesome soldered joints.

SPACE ECONOMY. Double-sided mounting plus the small size of the XY Universal Switch save much valuable space in your exchange.

VERSATILITY. The XY Universal Switch serves as linefinder, selector or connector. The famous "Fourth Wire" solves party-line and other problems.

faster THAN EVER!

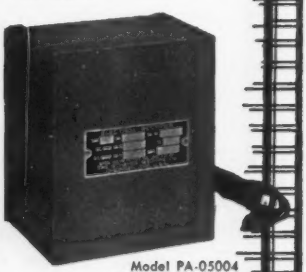
Your Stromberg-Carlson representative can tell you in full detail why it pays to put *your* company on the XY map. In Atlanta call TRinity 5-7467; Chicago: STate 2-4235; Kansas City: HArrison 1-6618; Rochester: HUbbard 2-2200; San Francisco: OXford 7-3630.

GENERAL DYNAMICS | ELECTRONICS

BE SU-RRR-E!

Make SCHAUER your source for dependable DC POWER!

SCHAUER is recognized by the Telephone Industry throughout the world as a leading manufacturer of battery eliminators and battery chargers for almost every DC power requirement. You save with Schauer—on low first cost, low operating cost, and reliable service. See your Jobber or write for Bulletin No. 1470.



Model PA-05004
Schauer Battery Eliminator

Here's a sure SCHAUER power source for the operator's circuit on magneto switchboards

Schauer Type PA-05004 Battery Eliminator delivers constant, hum-free direct current to the operator's circuit. Equipped with relay for automatically transferring power to stand-by dry cells in the event of AC failure. Standard capacity is 4 volts DC at 0.5 amps. Steel case, for wall mounting is 5½"x6¼"x4".

Rectifier Division
SCHAUER
MANUFACTURING CORP.
4516 Alpine Ave., Cincinnati 42, O.

construction design. Our experience indicates that, in general, the warning devices should be placed well in advance of the restriction to traffic flow. We must be continually aware that a vehicle travelling sixty miles per hour is only thirty seconds from the work area when he passes a warning device that has been placed half a mile in advance of the work operation.

It would be impracticable to establish hard and fast rules governing the location of traffic warning devices used to protect our work operation areas. Understandably these rules must be constructed locally, at the scene of the work operation, and then only after a careful evaluation of both traffic flow and field conditions. The acid test for the accuracy of a warning device location is to observe the reaction of drivers as they approach and pass through the work area warning and guidance pattern. The conscientious workman will test his pattern himself by driving through the work area in his own vehicle.

Low Level Guidance

THE responsibility for guiding traffic around or through the work area with a minimum of interference is ours. The motoring public must be warned of the work operation and must be directed through it in a careful and safely planned vehicle flow. The standard 18 or 28-inch traffic cone has proved adequate for use as a low level guidance device. Cone spacing problems parallel those stated previously for the high level warning devices.

The speed and rate of flow of the vehicles will help determine the number of cones required and the distance between placement. Normally, the guidance pattern will begin at the first warning device, will continue through the work area, and will lead the vehicles back to their normal lane of travel. Our experience has indicated that, in general, cones will be properly spaced if placed one foot apart for each mile per hour travelled by passing vehicles.

Requirements for work area protection during the hours of darkness varies only in that the devices used must be capable of supplying lights rather than flags. During the hours of darkness as well as during daylight hours the use of too many lights, flags, cones or signs can confuse the driver and will create a camouflage reaction in the minds of approaching drivers. Equally detrimental to the total program of traffic warning is the practice of setting up warning devices for a progressing work operation and then failing to move the devices ahead with the operation. An example might be employes working on a pole line at the edge of a travelled roadway who find themselves a mile ahead of their warning devices when they stop for lunch.

Not only would they have progressed out of the "safety" zone and into the "hazard" zone, but they would also have contributed to public disregard for warning devices.

The average motorist will soon lose respect for warning devices if he repeatedly approaches and passes warning devices and finds no work operation or set-up presenting interference. We must not "cry wolf" unnecessarily.

Summary

IN PLACING control devices along the streets and highways the following general principles should be kept uppermost in our minds:

(1) The driver must have sufficient time in advance of the warning to understand the intent of the message, to react, and to proceed safely.

(2) The warning devices must be located in a position visible to all approaching traffic but not so located that they become a hazard in themselves.

(3) Each warning or guidance device must be a necessary part of the overall protection plan and must not appear as a confusing item or device to the drivers of approaching vehicles.

To some of us this will be a new philosophy or perhaps more clearly a departure from our normal warning and guiding program. It is our considered opinion that the key to the safety of the utility work force and the motoring public is: (1) Warn, not barricade; and (2) guide, not direct. — *Norman J. Phillips.*

SUB-HARMONICS and OVERTONES

By C. D. EHINGER
Pres., Citizens Telephone Co., Decatur, Ind.

"Include All Departments In Your Plans"

PROPER COORDINATION IS IMPORTANT

There are occasions when construction is required on an emergency basis. Such unplanned and unwanted programs benefit neither the company nor its employes. Planned programs sometimes do not fully live up to their name when only one department has been involved in making the plans.

IT HAS become a tradition in the telephone industry that the coming of the spring months signifies the start of construction activity for outside plant. Like most traditions, this one is as full of holes as grandma's lace curtains.

Most certainly, those companies which are located in the southern parts of the country are able to carry on nearly year-around programs of intensive construction. Here, in the northern part of Indiana, the advent of mechanical diggers, improved bad-weather clothing, open highways and roads, and several other factors have changed the entire picture to the point where year-around construction can proceed, if necessary.

Sleet-Belts Do Exist

I CAN remember some years ago when we invariably were required to perform a great deal of construction that had been neither planned nor desired. I am referring, of course, to those years when this particular section of Indiana was in the so called "sleet-belt." Some 10 or 15 years ago, I would have given no person an argument about the existence of a "sleet-belt" and the fact that our groups of exchanges were squarely in the middle of this belt.

There can be no more sickening, maddening, and frustrating sight than that which can be watched as ice builds up to the point where each conductor on a pole lead is carrying as much as an inch and a half diameter of ice, and the tree limbs begin to crack and fall as they reach the breaking point from their own load of ice.

In reality, the frustrating part about such a situation is that all that you can do about it is to watch as your plant goes down before your eyes. Most certainly it is impossible to run out and cover the thing with a blanket, although the natural inclination is to run, and keep on running, far away from the whole mess.

We have often had cases of heavy ice accumulation where little, if any, damage occurred. These fortunate cases only happened when no winds accompanied the sleet storm. Usually, however, our sleet storms almost invariably came to us on an east wind — just the opposite of our prevailing wind.

A Safety Factor Of Two Is No Help

WHEN ice has built up to a diameter of three quarters of an inch to an inch and a half of ice and is accompanied by wind gusts to thirty-five or forty miles per hour, there just does not seem to be any way of building an open wire lead to withstand such situations. Engineer a safety-factor of two into the lead and the poles won't snap off. Instead, the butts will kick out of the soft ground and the entire lead goes over with the pole intact. I have driven down roads immediately subsequent to a sleet storm and had the old feeling — "missing — one entire pole line" — and have found it 50 or 70 feet away with the entire lead over in the field on pole roof and crossarm and with the butts standing straight up in the air. So — don't tell me that there are not many cases, in this industry, of "Spring Construction" which were neither planned nor desired.

You may have noticed in the foregoing that I have used the past tense in stating that we were considered to be in the sleet belt. Year by year, we have noticed that the heavy areas of sleet seem to be moving further south from us and now appear to be nearly one hundred miles south of us.

This seems to follow along with the theory advanced

by meteorologists and students of our weather who claim that our climate pulsates in cycles of fifty-five years duration. According to the theory, it should be nearly 55 years before our area is again in the middle of the "sleet-belt" and, as far as I am concerned, I not only hope that they are absolutely right, but it is perfectly agreeable with me if none of our exchanges are ever within ICBM range of sleet storms.

(Author's Aside: — In commenting upon the safety factor built into pole lead, I couldn't help but wonder how many of you actually calculate what safety factor you are building into your pole leads based upon the size, class, and type of pole used and maximum weather, or other stresses, which the pole lead may encounter. Fire in your letters on this one — perhaps it would make a topic for some interesting debates — at least I have never seen any literature published on what factor of safety should be used for a toll lead, a local distribution lead, etc.)

Spring Construction programs involve more than the outside plant department, and proper coordination and planning of the project can result in a closely knit and smoothly running company.

Outside Plant Problem Only?

ANOTHER point has always interested me about this long standing tradition of our industry concerning the advent of construction with the coming of spring. Everyone seems to blithely assume that such construction is more or less confined entirely to the plant department (outside plant) and really doesn't affect any other department to a great degree. I object to this line of reasoning quite violently and believe that it can easily be shown as fallacious.

Most certainly management is heavily involved in spring construction programs from the standpoint of original approval of such projects and, possibly more importantly, from the standpoint of making certain that financing is adequate and available for the needs of the project.

The accounting department is heavily embroiled in allocating all of the materials, labor, and overhead costs to the proper capital plant accounts, depreciation reserve, etc.

The commercial, public relations, and sales departments are affected from the standpoint of what the new or enlarged facilities will mean as far as providing fodder for their mills in relation to the present subscribers and to potential subscribers.

The traffic department is affected from the standpoint of the new facilities providing a greater load, or faster speed of service, or new avenues of approach to distant points.

"Most Heavily Involved — Central Office"

IT IS my personal feeling that the department which is probably most involved, in relation to spring construction programs, is the Central Office or Inside Plant Department.

It is my humble opinion that we have too many telephone companies, both large and small, where there is an almost unbelievable lack of coordination, cooperation, and combined planning between Outside Plant and Inside Plant Departments when it comes to the Spring Construction Program.

As an example, let us assume that new cable facilities are a part of the program. Most certainly, it is vital that the Central Office Department be a very large partner in the planning of such an addition. In this particular case, it is obvious that terminating facilities must be provided in the central office. Whether or not we are in an economic recession at the present time, the situation still prevails whereby any item of central office equipment cannot be secured from the supplier on short notice.

With somewhat long delivery dates in prospect, it will have been necessary for the central office department to order additions for mainframe three or four months in advance of the anticipated completion date of the cable project. Even prior to that date, it will have been necessary that floor space allocations be checked, cable vault run determined, and a few other odds and ends engineered and planned before the office can be ready to properly terminate the proposed cable.

In addition, the method of providing proper records for the new cable pairs, protection if required, and provisions for aid during splicing and acceptance tests must be made. I believe it to be quite obvious that the Outside Plant Department cannot plan such an addition without vitally involving the Central Office Department or chaos will result.

"The Case Of Toll Facilities"

PERHAPS one more example will suffice to make my point. Let us assume that some additional toll facilities are being built as a part of the Spring Construction Program. Here, even more so than in the case of cable additions, the Central Office Department must have many months of advance knowledge of the pro-

Please turn to page 60

U.S.I.'s custom engineered . . .

Type 40 PABX System

A complete system designed and engineered to your requirements, offering unlimited capacities with cord or cordless attendant's switchboard or inward dialing, is available for your subscriber needs. Efficient, modern design and overall economy of operation, assures lasting satisfaction. We're available at Charlottesville 3-5153. Call or write for your copies of Catalogue P60F6.

Type 40A - Floor Mounted

Type 40B - Floor Mounted

UNITED STATES INSTRUMENT CORPORATION

CHARLOTTESVILLE, VIRGINIA

Thornhill Publishing Company

A Division of
Western Utilities Corporation

TELEPHONE
DIRECTORY
PUBLISHING

Selling — Printing — Engraving
Production — Distribution — Collecting
Counsel for Advertisers

OFFICES:

300 Montgomery Street, San Francisco 4, Calif
2911 Bond Street, Everett, Washington
13771 S.W. Farmington Road, Beaverton, Oregon
116 South Rusk Street, Kilgore, Texas
130 East Lime Avenue, Monrovia, California

Call any of our offices
for a free estimate on your directory
potential *today*—no obligation!

2 NEW FEATURES OF
FITCHBURG CHIPPERS

Give you longer engine life, save gas, add safety

1. **EXTRA PROTECTION** for your brush disposal crew with NEW SAFETY STOP SWITCH (now standard at no extra cost). Stops chipper within seconds.

2. **GREATER ECONOMY** with NEW SOLENOID SWITCH*. Allows operator to idle motor between actual brush feedings *from his normal feeding position.* You save on gas and engine wear.

TROUBLE-FREE Fitchburg Chippers chip tree trimmings fast. Feeding action is smooth, positive, because of *patented* spring-activated feed plate. Fitchburg Chippers are choice of telephone, power and tree service companies, and others. Send for *free book* "Chip Dollars" — write Dept. TEM-14.

*optional

FITCHBURG ENGINEERING CORPORATION
FITCHBURG, MASSACHUSETTS

posed toll circuit additions if it is demanded that they be ready at the same time that Outside Plant is ready to turn up the facilities.

Proper terminations for the voice facilities and the signalling facilities must be ordered, secured, and wired into the office. Proper toll board facilities, if a toll board is involved, must likewise be ordered, secured, and wired into the office. Testing facilities must be made available. All records, circuit prints, and other items of vital information must be coordinated with the project.

I do not wish to belabor the point any further as I may have already beaten it to a pulp. However, this much I do know — Spring Construction Programs involve far more people and departments than just the outside plant department. All groups become somewhat shaken up in the process and all groups emerge larger and stronger as a result of the Spring Construction Program.

"Run a 'Tight-ship' "

I BELIEVE there is one good lesson to be derived from all of this — proper coordination and planning of the project can result in a closely knit and smoothly running telephone company — the navy calls it a "Tight-ship." The lack of such cooperation and planning between groups results in a telephone company that grows like Topsy and will eventually prove detrimental to all employes, subscribers, and stockholders of the telephone company in question.

Moral: — Make certain that all Spring Construction Programs are, in reality, Fall planned and coordinated programs which bear fruit in the Spring. — *C. D. Ehinger.*

— 73 —

Any comments, criticisms, or suggestions for future topics? Address all correspondence to "Sub-Harmonics and Overtones," Telephone Engineer and Management, 7720 Sheridan Road, Chicago 26, Ill.

REFERENCE BOOKS

Electrical Fundamentals (Direct Current.) Prepared for use by the military services, this manual presents the electrical fundamentals of direct current. It covers such subjects as magnetism, electrification, conductors and insulators, current, voltage, resistance, Ohm's law, primary and secondary cells, circuits, inductance, and many other phases of direct-current electricity. 1951. 186 p. il. Catalog No. D 101.11:11-661. Price $1.00. *Order from Superintendent of Documents, United States Government Printing Office, Washington* 25, *D. C.*

Electrical Wiring. This Army technical manual provides practical information in the design, layout, installation, and repair of interior electrical wiring systems. It discusses in detail design of interior wiring systems, construction methods, and tools and materials. It includes information relating to methods of repair, remodeling, and extending existing wiring systems, and the necessary safety precautions to be taken in connection with electrical installations. Foreign wiring practices and the principal voltages and frequencies used by foreign countries are also described. 1957. 91 p. il. Catalog No. D 101.11:5-760. Price 50¢. *Order from Superintendent of Documents, United States Government Printing Office, Washington* 25, *D. C.*

"Basic Electronics," by Van Volkenburgh, Nooger & Neville, Inc. Only a knowledge of the basics of electricity is necessary for you to easily master the basics of electronics. More than 800 carefully selected drawings make the function and operation of vacuum tube diodes and power supplies, oscillators, amplifiers, receivers and transmitters crystal clear.

#170, Vols. I to V in soft covers, $10.00; #170-H, all 5 vols. in one cloth binding $11.50.

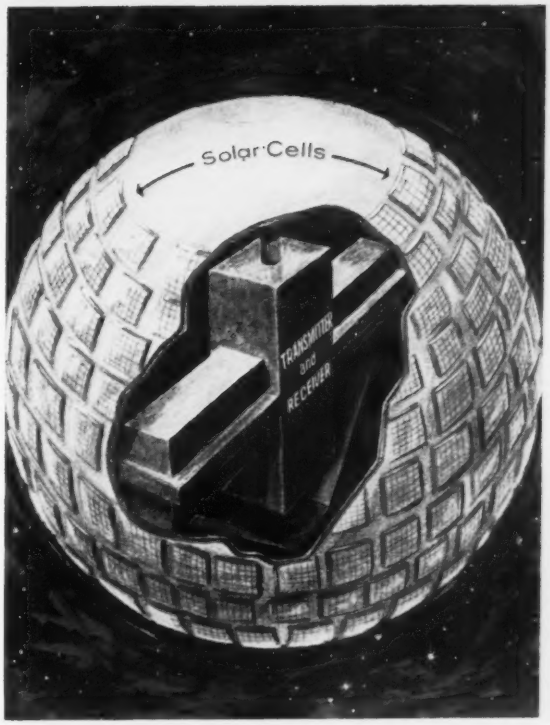
"Basic Electronics" Vol. 6 only — for the many who have completed the 5-volume course, can be purchased separately. #170-6 soft cover $2.90; cloth, $3.60. *Order from Educational Division, Telephone Engineer & Management, 7720 Sheridan Rd., Chicago 26, Ill.*

TELEPHONE ENGINEER
AND MANAGEMENT'S

REPORT ON SPACE COMMUNICATIONS

By FRED HENCK
and TOM MALIA

The principal problem concerns frequency allocation and the suggestion of frequency sharing, and the issue is "how much sharing, with whom and on what basis?" (Concluded from the April 1 issue, *Telephone Engineer & Management.*)



An artist's conception of the cross-section of an active repeater satellite. About 50 of these satellites would be placed in random polar orbits at a height of about 3,000 miles above the earth.

IN THE Lockheed report and in just about every other discussion of project satellite communications system, one subject which comes to the fore as a principal problem is that of frequency allocations and the suggestion of frequency sharing.

It is here that some of the biggest problems, both technical and political will arise. To begin with, the most conservative space communications system advocates talk in terms of 1500 megacycles in spectrum space requirements, and others, including AT&T, estimate that in the neighborhood of 2000 mc will be required. With the frequency space in the optimum area, from 1,000 to 10,000 mc, already pretty well earmarked, it is evident that there are only two possible answers — (1) sharing with other services; or (2) taking space away from the other services to which it has been allocated in the international lists.

Once frequencies have been allocated to a particular service, taking them away is roughly equivalent to stealing a fish from a hungry polar bear. Taking into account the technical assurances of such organizations as the Electronic Industries Association that sharing is both feasible and necessary, the issue seems to come down, not to whether sharing is necessary, but rather to just how much sharing, with whom, and on what basis, is called for.

Most opinions on this subject, naturally, are based on scientific theories, because of the paucity of actual operational data now at hand. As a result, accumulation of information on interference and sharing will be one of the major roles to be played by the U. S. government in the space communications field.

For one thing, there has been considerable discussion of testing sharing of terrestrial radio operations with space satellite communications through the use of the military satellite programs. The government will be able to control the conditions under which some of the military operations will be conducted, and can readily set up a program which will provide answers to some of the $64 sharing questions.

The Office of Civil & Defense Mobilization, which has overall responsibility for frequency use by government departments, is giving special attention to gathering data on sharing and interference. One of the components of the OCDM communications structure is the Interdepartment Radio Advisory Committee, which passes on government frequency uses. OCDM has advised IRAC member federal agencies that special attention will be given requests for frequencies for space communications, adding that "Far more information regarding space communications and the interference patterns that will affect its use must be available before a more definitive approach is possible."

In approving AT&T's plans to conduct extensive research into earth-satellite communications, the FCC observed that the experiment should "provide reliable in-

"No wonder they're pleased,

it's so easy to expand with Strowger"

Keeping up with future growth is a vital point in choosing dial equipment. That's why Keith Regel* always shows a customer how easy it is to expand with Strowger. Keith explains that Strowger is assembled in small, self-contained units. Here's what that means to the telephone company...

By simply adding units, you meet increasing traffic with minimum effort and expense. Handy extra banks take care of moderate growth—you simply jack-in another switch. For larger expansion, you just slip pre-wired shelves in place and connect a cable.

Are you planning a dial conversion? Then get in touch with us. We'll send *your* AE representative in to help you solve your dial conversion problems. He can give you the complete Strowger story. And, he can provide you with information on how to finance Strowger dial equipment. To contact your AE representative, just write Automatic Electric Sales Corporation, Northlake, Illinois. In Canada, Automatic Electric Sales (Canada) Ltd., 185 Bartley Drive, Toronto 16.

**District Manager, Western District, Automatic Electric Sales Corporation*

AUTOMATIC ELECTRIC

Subsidiary of

GENERAL TELEPHONE & ELECTRONICS

GENERAL SYSTEM

formation concerning the feasibility of space satellite communication and frequency sharing problems."

The Commission declared that it was in "substantial agreement" with nine organizations interested in the private microwave field which objected to the companion AT&T request for rulemaking to permit a start toward commercial service.

"We believe that there is insufficient data now available to permit a public interest determination on the question of allocating a particular band of frequencies for space satellite communications," the FCC stated. "Moreover, we feel that denial of the (AT&T) petition for rulemaking at this time will in no way delay the overall United States space program."

AT&T, which has said it is "most anxious to have an active satellite in orbit within a year," has asked the government to supply launching facilities for which it has offered to pay the costs.

"Through satellites we will be able to supply the fast-growing need for international communications," AT&T has pointed out. "Our cable and radio network carried nearly 4,000,000 telephone calls last year, and calling is increasing by nearly 20% every year. By 1980, we expect there will be 100,000,000 calls a year, 25 times what we have today. In addition, satellites will make possible the international transmission of television and other forms of communication not feasible with today's cable and radio circuits."

At the time the FCC announced approval of the AT&T plan, the agency commented that the telephone company "plans to investigate various kinds of data and other communication. No commercial service is intended or permitted. The contemplated operation will be an extension of space research activities being conducted by AT&T in collaboration" with NASA.

"While the cost of the transmitters, antennas, power supplies, and associated equipment will be borne by the AT&T company, the actual launching of the satellites will be handled by NASA on an actual cost basis in a cooperative effort with a view of obtaining additional technical data in the field of space research. The cost of the earth station will be $106,000 or more, while that of each of the six space or satellite stations will be approximately $250,000. The cost of launching a single satellite of the size and weight necessary for the proposed purposes has been estimated at $3,000,000."

The filings by the various companies and organization's in the FCC's long-range inquiry into space communications demonstrated that there is no lack of ideas as to how such a system should operate, and this new field for conquest naturally has produced sharply conflicting views as to what would be the best methods for setting up the operation.

"High Altitude System"

WHILE AT&T took the position that the delay of at least six-tenths of a second in a round trip telephone conversation would make voice service via a "stationary" satellite system unsatisfactory, two members of a three-company team which has been working on satellite communications have lined up generally in favor of a high altitude system.

The two proponents of the synchronous system are the Radio Corp. of America and RCA Communications, jointly, and the Lockheed Aircraft Corp. The third member of the group, GT&E, did not reach any conclusion on the subject in its brief filing with the Commission.

The companies, incidentally, are allowed to cooperate in such a venture without violating the antitrust laws by reason of a U. S. Justice Department "railroad release" permitting the joint study of space communications by the three companies.

Under a "railroad release," no criminal proceedings will be instituted so long as the program is carried out as specified by the person requesting it, and "full disclosure of contemplated action" is made.

"Low Altitude System"

ANOTHER plan presented to the FCC was from the General Electric Co. and calls for a "low altitude," or 2000-to-6000 mile orbiting, 10-satellite system. In contrast with the other main proponent of a low altitude system, AT&T, General Electric has suggested relatively less frequency space for the operation, and has contended that sharing with terrestrial point-to-point operations is necessitated by space communications frequency requirements.

AT&T, in view of the FCC's microwave policy decision of last October, has limited its discussion on sharing to the common carrier bands, but has emphasized that in view of the scope of space needs, much of the frequency space required will have to come from other bands.

AT&T's filing also summed up some of the advantages of using a space satellite system, instead of the more conventional radio or cable methods of obtaining international communications services.

It commented that "The attractive feature of using satellites for earth-space-earth communications is that it permits the use of microwave frequencies for communication between points separated by thousands of miles over water or inaccessible terrain. Microwave communications systems can be made wide band, and permit the transmission of large numbers of telephone circuits, high-speed data, and television signals." The other methods of international communications are much more limited in bandwidth.

Approaching the same subject in a slightly different way, in a discussion of the needs which satellite communications can fill better than other operating methods, AT&T declared that while cable bandwidths will increase in the future, "the practicable bandwidth of microwave systems seems inherently greater. Using microwave frequencies via satellite relays to communicate to other countries appears to be practically essential to

provide the many broad band circuits which will ultimately be required for worldwide television, data transmission, and telephony.

"A satellite system will provide direct linkage with countries that cannot be reached directly by submarine cables. Moreover, since satellite systems and submarine cable systems are subject to entirely different possible causes of service disruption or interference, diversification will greatly improve the overall reliability of overseas communication."

GE Favors Low-Altitude System

GENERAL Electric, in lining up in favor of the so-called low altitude system, as best for relayed traffic, such as voice, agreed that a "complete evaluation" of the subject of transmission delay is required. It said the general conclusion it has reached to date from discussing the subject with operating communications company people is that the present telephone plant "is designed to satisfy established standards of echo. While a change in the standards is possible, it does not appear feasible due to the expense involved. Therefore, any new communication mode should meet, or better, existing standards."

Lockheed, in its most recent filing in the Commission's long-range space inquiry, commented that "At this time, the continuing joint studies indicate sufficient promise to warrant a hope that it may be possible for an appropriate application to be filed with the Commission in the near future for a satellite common carrier certificate for the type of Telesat operation described herein, assuming the interest and cooperation of the Commission and other interested government agencies."

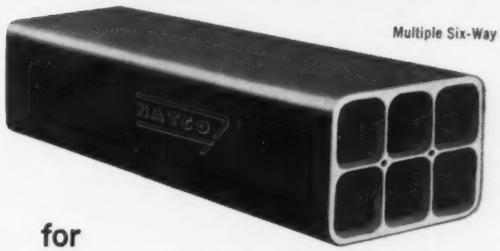
The aircraft company said that Telesat would function "primarily as a satellite link which would provide channels to all international voice and record carriers desiring to use such channels. Since, aside from possible government use, the primary user of the satellite channels would be in the international voice and record carriers, Lockheed believes that Telesat should be 'open end' in the sense that all United States international voice and record carriers desiring to do so should be permitted to participate in the ownership thereof."

Conclusion

IT IS usually appropriate to conclude any report from Washington with a word from the federal government. When the subject under discussion may involve a combination of companies working together, the last word frequently comes from the Justice Department's Antitrust Division.

To date, the word is as follows, in connection with the grant of the "railroad release" permitting the Lockheed-RCA-General group to study satellite communications: "We appreciate the importance and urgency of satellite communications, and we realize that the magnitude of such a project might make it difficult for a single company to carry on the necessary development work, and that competitive considerations require that no one firm dominate satellite communications." — *Fred Henck* and *Tom Malia.*

NATCO CLAY CONDUIT

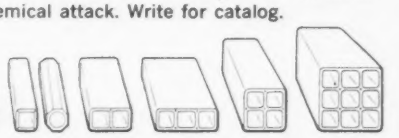


for

PERMANENT PROTECTION OF UNDERGROUND CABLE

Natco Clay Conduit is furnished in both single and multiple duct for the permanent protection of underground telephone, telegraph, signal, power and lighting cables against fire, corrosion, electrolysis, mechanical injury and chemical attack. Write for catalog.

ALSO AVAILABLE IN . . .



natco corporation
327 Fifth Avenue, Pittsburgh 22, Pennsylvania

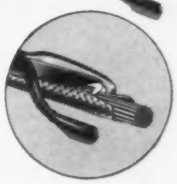
Slit and Cut Cable Sheath Fast and Easy!

Neuses Cable Tools

CABLE SHEATH SLITTER

No. N-62267

Just the tool needed for slitting most of the outdoor, heavy-duty types of cable coverings — large or small diameters.
Cuts into cable jacket at any point without previous notching. Size 6"x 1½". Price with 2 blades $4.20.



RING CUTTING CABLE TOOL

No. N-2060

A real handy tool for "ring" cutting the sheathing of INSIDE TYPE plastic, fabric, or rubber covered cable 3/16" to ½", or thin sheathed cable up to 1" diameter. Cut through cable sheathing *limited* to 1/32". Price $7.40.

Write for Catalog.

P. K. NEUSES, INC.
Small Tools for the Communication Industry.
511-21 N. DWYER ST. ● ARLINGTON HEIGHTS, ILL.

TELEPHONE ENGINEER
AND MANAGEMENT'S

REPORT

ON "COMPACTS"

Plant Men Look Over The Compact Car Field

COMPACT PASSENGER CARS AND TRUCKS

The small, light-weight vehicles have caught the public's fancy, and telephone companies report that the two major factors in favor of the compact car are lower initial investment and greater gas economy.

By DICK REYNOLDS

Associate Editor, "Telephone Engineer & Management"

THERE has been a great deal of discussion, both pro and con, on the merits of compact cars. These small, light-weight vehicles have caught the public's fancy and people are coming more and more to accept them because of their low purchase price and comparatively minor operating costs. It is probable that repair expenses on compact cars will be no higher than repair costs of standard size models. As yet, they have not been in use long enough to determine if their trade-in values for replacement cars will be comparable with regular size vehicles. Vehicle trade-in values are an important factor in the over-all picture of motor vehicle costs to the telephone company.

The Ohio Bell Telephone Co., speaking only for its own group, has found that the two major factors in favor of the compact cars are lower initial investment and greater gas economy. An article in "The Ohio Bell" states that the initial cost averages $300 less for compact cars than for a standard model. This company has more than 300 compacts now in use. Gas consumption has been low. In more than one million miles last year, compact cars averaged 23 miles per gallon, compared with 14.5 miles for the standard cars.

No unusual maintenance problems or costly repairs have been encountered on this type of car. One car used on a Dayton, Ohio mail run has been driven 95,000 miles without major repairs and is still in good condition. Other advantages stated for the compact cars are lower cost for parts, less anti-freeze, less expensive tires which wear longer because of the cars' lighter weight. In addition, more compact cars can be parked in the same area required for regular size cars, thus making more economical use of the company parking lots. Five compacts can be parked in the space required for four regular cars.

The use of the compact car by the company is a matter of dollars and cents economy. Since early in 1958, this company has purchased every model of small economy cars manufactured in this country with the exception of the Mercury Comet. In addition to its original Nash Rambler American, Ohio Bell now is using the Ford Falcon, Chevrolet Corvair, Studebaker Lark, and Chrysler Valiant. The company's experience with the compacts is summarized as follows:

A sales engineer has put almost 24,000 miles on his 1959 compact car in 18 months. His car has averaged more than 21 miles per gallon. He has had no major repairs made on it. In fact, not one cent was spent on

FIG. ONE: — This compact type car with rear engine is used by traveling supervisor. (Ohio Bell News)

it during its first year. The original tires are still in good condition. The car is said to be excellent on rough roads because of its unitized construction.

A wire chief has driven his car 3,000 miles in three months and reports he likes it better than his 1959 standard size vehicle because it is quieter, smoother, and much easier to handle. It has averaged 23 miles per gallon during periods of its use. This car exhibits low power on hills which is not a problem if care is taken to maintain the car speed and not lose momentum. He likes its compact size, its easy entry, more head room and bigger trunk space. This car has a simple bolt-on construction which permits easy inexpensive replacement of damaged parts. The parts themselves are cheaper than the corresponding parts on standard cars.

Plant employes in the company also like the compact cars because of their solid construction and rugged dependability. Garage personnel like the car engines as they are said to be easier to maintain and will take the punishment of hard country use. The cars are said to be reliable and rugged and so far have been giving an average of 23 miles per gallon.

Van-Type Trucks for Installation Jobs

THE SO-CALLED foreign small cars which started the revolution in the automobile world towards small and more compact cars have also entered the telephone company field.

The *Blue Bell*, a publication of the Bell Telephone Co.

FIG. TWO: — A wire chief uses his compact car to travel to job sites.

of Canada, recently described an application of a foreign small car to plant use. This company introduced two types of installation vans at the beginning of 1959; the Thames made in England and the Volkswagen developed by the manufacturers of the well-known "German People's Car."

Both types of vehicles offer big money saving advantages. They are cheaper to buy, cheaper to run, and cheaper to garage. At the same time, they provide the installer and repairman with a high standard of comfort and convenience; for example, the Thames installation van is roomy inside and the entire car is heated. Even in freezing weather, the telephones are kept warm inside the van. Previously, the installer would practically freeze his fingers every time he took something out of his truck during winter in the cold northern clime. With this type of vehicle, when it is raining or snowing, he can climb into the van, close the door, and be out of the weather.

The installation van has everything inside it within easy reach. Tools and equipment are stacked on built-in shelves and there is plenty of room to move around.

According to motor vehicle people in the Canada group, the compact vehicles have proved much better than they had expected. Their economy helps keep costs down and the employes using them like the cars.

A French manufactured group of vehicles designed along the lines of a van type of panel truck includes the Renault Petit-Panel illustrated in *Figure Six* and a raised roof panel unit called the Hi-Boy, shown in *Figure Seven*. These two truck models were exhibited in New York last year and are now on the market.

Although only 161 inches in length, the Renault trucks are said to be capable of accommodating a payload of 1,950 pounds or a cargo of up to 236 cubic feet. They have a flat floor that is 14 inches above the ground. This low loadbed together with full-opening, full-height, side and rear doors, facilitate loading and unloading operations.

These vehicles have an interior height of either 60 inches (Petit-Panel) or 72 inches (Hi-Boy) for easy loading and comfortable working inside the truck. The translucent fibre-glass roof is an interesting feature of the Hi-Boy, which provides a well-lighted interior. The turning radius of these trucks is only 15 feet, permitting U-turns in streets 30 feet wide and facilitating on-street parking.

Automobile manufacturers in America have also introduced van type vehicles of their own design on the

FIG. THREE: — Motor vehicle mechanics like compacts for their easier maintenance and rugged dependability.

FIG. FOUR: — On the road, the compact's smaller tires are easier to change and last longer because of the car's lighter weight.

FIG. FIVE: — The Thames installation van has plenty of space inside for telephone materials and tools and is very convenient to use. (Blue Bell)

IMPORTANT NEW PRODUCTS

IF YOU HAVE CABLE TO LAY...

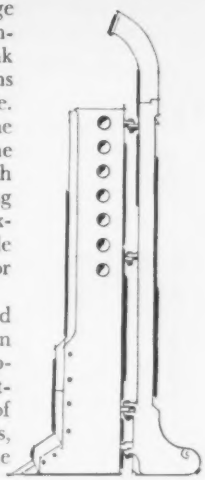
here's the newest, fastest, most profitable method!

In our vast missile base construction program alone, there will be an estimated 100,000 miles of underground cable to be laid. Heretofore this work has been both time-consuming and costly with trenching providing the most accurate method of placing cable in the ground.

Now, the Kelley Products Division of Crutcher, Rolfs, Cummings, Inc., Houston, Texas, introduces a cable laying attachment for all models of Caterpillar track-type Tractors equipped with a Cat hydraulic control unit. Cable is precisely laid at specific depths in a fraction of the time formerly required *and* with 60 to 90 per cent less cost.

The new Kelley Cable Layer puts down any cable up to 3½" O.D. at depths ranging from a 12" minimum with the D4 to a 72" maximum with the D9. The laying shank is far enough behind the tractor to permit unrestricted maneuvering without deviating from the cable line yet close-coupled enough to provide accurate control of depth and position. Vertical movement of the tool bar is attained by two 7" hydraulic cylinders with 48" stroke. Lateral movement, also hydraulically controlled, permits offset laying within 24" of paving or buildings, abutments, shoulders, culverts, bridges, etc. Exacting placement of the shank is attained. This feature also permits steering of the cable-laying shank when turns are made.

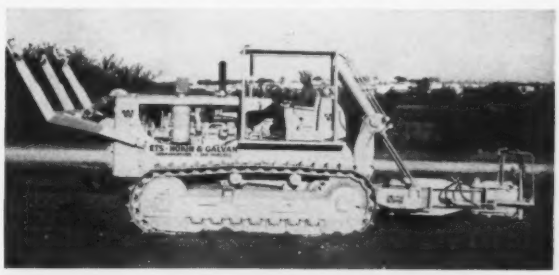
Shanks are available in a variety of cable-matching sizes and widths to reduce drag and possible damage. Shanks are of high-alloy, wear-resistant steel with replaceable leading edge and point. The cable guide or conduit, attached to the ripping shank with hardened pins, swivels and opens for easy removal or insertion of cable. A roller section, at the bottom of the conduit, guides the cable into the channel created by the ripper with the very minimum of drag, bending and friction. Cable pull rarely exceeds 100 lbs. with the Kelley Cable Layer though cable is designed for much higher load.



Cable reel carriers, front-mounted for better balance and visibility, can be custom-engineered for specific applications. Control is by a Cat front-mounted Cable Unit. Full reels of cable, weighing up to 7000 pounds, are automatically unreeled by the drag or pull on the line.

On actual cable-laying contracts, the Kelley Layer averages about a mile of cable each hour. When a Kelley extra-heavy duty Ripper is used in conjunction to open a path for the Cable Layer, production is profitably boosted. The speed and accuracy of the Kelley Cable Layer reduces costs over previously-used methods by 50 to 60%!

Kelley Cable Layers have already proven their ability on several major construction projects. If there is cable to lay on a contract, present or future, contact your Caterpillar Kelley Dealer for more information on the new money-making Kelley Cable Layer.



KELLEY PRODUCTS DIVISION
Crutcher-Rolfs-Cummings, Inc.
P.O. BOX 2073
HOUSTON 1, TEXAS

5988

market as *Figures 8 to 10* indicate.

In *Figures Eight and Nine* are shown the Ford Econoline van type trucks in use by the Michigan Bell Telephone Co. This type of truck is mounted on a 90-inch wheelbase.

The Econoline van units are said to carry a volume and load comparable to conventional pickup or panel trucks, yet have less weight, greater maneuverability, offer better economy, and take up less space. This type of truck has an overall length of 168.4 inches, width 75.8 inches and the height of 77.2 to 79.2 inches, depending on model and springs.

The new vehicle is powered by a 85 horsepower, 144-cubic-inch engine. This engine is mounted forward, beside the driver's seat which allows ample pass-through space in the front, flat floors and rear, low 25-inch loading heights, and easy accessibility to the engine without disturbing the cargo. The cab-forward design also makes for good front vision and maneuverability.

A unitized body and frame construction, galvanized rocker panels, aluminized muffler, and conventional solid I-beam front axle with longitudinal leaf springs are features said to make the vehicle durable.

The payload capacity of the van type truck is more than 900 pounds with standard equipment, and nearly 1,700 pounds in the heavy duty model.

Length of the load space area is over seven feet. The interior height cargo area is 54 inches, with a total volume behind the front seat of 204.4 cubic feet. The cargo doors are more than four feet wide. The front seat headroom is approximately 40 inches, legroom 42.6 inches, and the door step to the ground 19 inches.

The Chevrolet Corvair 95 Corvan illustrated in *Figure* 10 is another make of van type truck that will be found adaptable to telephone installation work. This type of vehicle incorporates Chevrolet's unique combined engine, transmission and rear axle gearing in one unit, which is small enough to fit between the rear wheels and below a conventional height load platform. This arrangement leaves a large part of the chassis space to accommodate the payload and cab.

The van unit provides 191 cubic feet of cargo space and has 1800 pounds payload capacity. Big right-side double doors open on a capacious curb-level load compartment with 4½ feet of headroom for easy cargo handling. Wide-opening double rear doors add still more convenience, plus adaptability to a wide variety of cargoes and handling procedures. *Turn to page 72*

FIGURE SIX: — A sliding side door is used to load the new Renault Petit-Panel light truck which features forward-control and front-wheel-drive. Loading and unloading also can be done through double-doors and transom that open wide in the rear.

FIGURE SEVEN: — Renault Hi-Boy panel truck featuring a raised translucent fibre glass roof for easy handling of bulky cargo.

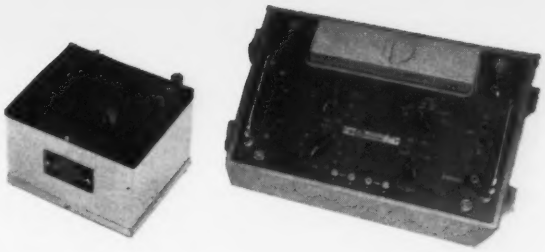
FIGURE EIGHT: — Installer is picking up telephone sets for a station installation job from the rear of a Ford Econoline truck. Note ladders carried in standard rack on roof of truck.

FIGURE NINE: — Showing how the side door makes tools and materials accessible on the Ford Econoline truck. Windows in side and rear improve vision for driver and provide light for inside tool and material compartments.

AIRTRONICS Far-end Terminating Set, designed to be used in conjunction with the Model 20B Test Hybrid, supplies the Far-end terminations required for return loss and singing-point tests.

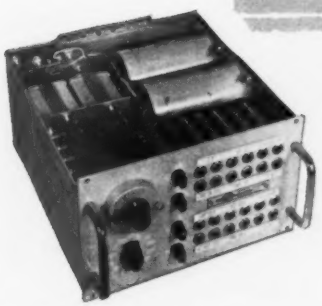
Generally, two precision networks, 115H and 115AL cover the standard cable layouts in exchange plant, (the 115H covering 19 and 22 gauge H88 facilities).

The Far-end Terminating Set consists of a precision network, network build-out decades, selector switch and jacks, and binding posts to give flexible access to the components.

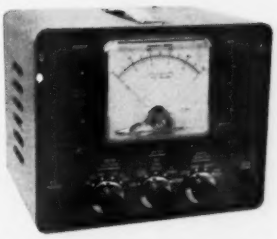


AIRTRONICS new multi-purpose, Portable Test Hybrid Set, Model 20B, makes acceptance, evaluation, and capacity balance tests easier, faster . . . locates cable opens accurately . . . accommodates standard networks. Either Singing-Point or Return Loss techniques can be applied. Accessories include external decade capacitor and variable resistor for use in locating opens, for compromise net, etc. Plug-in dial is also available.

DEPENDABLE PRODUCTS FOR MODERN TELEPHONY



AIRTRONICS completely self-contained Program Equalizer cuts line-up time from hours to minutes. Designed for operating on standard program-loaded or non-loaded communications cables, this unit features pre-tuned circuits in 1½ KC steps from 5 KC to 25 KC. Simple switch adjustments control insertion loss of the LC network, select values of L and C, regulate line-to-drop ratios, control the circuit location of the RLC network etc. Available in portable, wall-mounting, or standard 19″ or 23″ rack-mounting arrangements.



AIRTRONICS Pulse Meter is compact, easily carried, and plugs into the nearest 115 volt, 60 cycle ac wall outlet. Developed by telephone men FOR telephone men, the new pulse meter and power supply measures dial pulses from 0 to 15 pulses per second and percent make from 0 to 100 percent. It will accept loop, ground, battery, carrier, and polar-duplex pulses. Simple in operation, it can be easily carried and used at the test board, the telephone instrument repair bench — any place in the telephone exchange. For that matter, it can easily be moved to the actual subscriber instrument if the need arises. As an added bonus, the PMVPS-1 also gives you a dc power supply continuously variable from 0 to 300 volts. Use it to check transistor circuits, vacuum tube circuits, as a stand-by power supply — the sky is the limit! Best of all, you will be surprised that so much can be purchased for such a low price!

AIRTRONICS standard Artificial Lines accurately simulate a loaded or non-loaded cable pair of any desired length — from 600 to 39,600 feet.* Multi-position switches afford instant control over total length or load section lengths, so that coil spacings may be set to better than 1%, or as much as 10%. Common irregularities such as bridged taps, mixed loading or coils omitted can be introduced in a moment.

*Available with plug-in units for either #22 or #24 gauge cable, or mixed 22 and 24 gauge. Other commonly used gauges available on special order.

another product FIRST from

AIRTRONICS INTERNATIONAL CORPORATION

P.O. Box 8576, Fort Lauderdale, Florida (6900 West Road 84)

A high-strength, low-weight construction makes the most of the space inside, and a rigid frame-floor assembly replaces the traditional combination of separate chassis frame and body floor. It eliminates the major part of a separate frame's weight and occupies only a small part of the depth required by the frame-plus-floor combination. The vehicles drop-center load platform is less than 14 inches off the ground and yet provides clearance below for all-around maneuverability. It is provided with welded front, side and roof steel panels to strengthen the structure. This results in a saving in weight which provides extra cargo capacity, making for a payload capacity 40% of gross vehicle weight.

FIGURE 10: — The Chevrolet Corvair 95 model Corvan shown in an electrical industrial application can be used for transporting telephone supplies and tools used by installers. Note easy accessibility to materials through side door.

The "Metro-Mite"

THE Illinois Bell has introduced a new type of installation truck of compact size. This is the Metro-Mite Truck which provides installers with walk-in, finger-tip access to telephone equipment.

The installers say that the Metro-Mite is convenient because they can walk into the panel truck from out of the winter weather and because they have increased storage space for the equipment. Interior shelving has been designed by the Illinois Bell Telephone people to be used on either station repair or cable splicing work by suitable modifications to the shelf and drawer space. The truck carries easily-removable 10- and 24-foot ladders.

Fourteen of the Metro-Mite trucks have been under-

FIG. 11: — The Metro-Mite, a handy car for telephone installers, sports a rainbow hued slogan in front — "Color Comes Calling!" (Illinois Bell News)

going trials both in outstate and the Chicago area of the Illinois Bell areas since last spring and 34 new trucks have been put in use since the first of 1960. The trucks are similar in price to standard installation trucks.

The trucks have been given a colorful new look. They are finished in a two-tone color, light and dark green with colored poster space on each side and a rainbow hued slogan in front announcing "Color Comes Calling."

Compact Type Trucks With Pickup Body

ONE-HALF and three-quarter ton trucks with pickup body have been popular for years with telephone companies. Either the pickup body is modified to include a compartment box and tool and ladder racks, or a compartment type body is mounted on the chassis less the pickup box.

As shown in *Figures* 12 to 14, automobile manufacturers are now promoting compact type pickups in the approximate ½ ton and ¾-ton class. These vehicles feature ample payload capacity and cargo space and should be adaptable to telephone installation and maintenance use in light or heavy duty service. Two makes of pickup trucks feature cab-over-front wheels design and a model is available with side opening that provides a ramp for loading heavy objects as indicated in *Figure* 14.

Three-Wheel Motor Scooters Popular for Telephone Use

ALTHOUGH not primarily a compact car type, the three-wheeled scooters were among the first to mark the trend to a more economical motor vehicle design for telephone maintenance work.

Many telephone companies have purchased three-

FIG. 15: — The three-wheel truckster is ruggedly built for minimum maintenance and dependable service for installers and maintenance men and hauling parts and supplies. Inset shows cab and pick-up body cover. (Cushman Motors)

FIGURE 12: — A rugged, purpose-built truck is the Studebaker's 1961 Champ pickup truck designed for routine jobs as well as heavy duty work. It features passenger car type instrument panel, safety cone steering wheel, wrap-around wind-shield for good visibility and a 2-piece sliding rear window for interior ventilation. From its sturdy reinforced frame to the clutch and transmission, the components are designed for severe service, long life and economical operation.

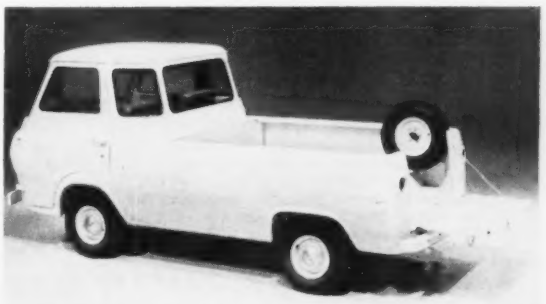


FIGURE 13: — The Ford's new Econoline series includes pickup model shown above. It is powered by a modified version of the 85-horsepower Falcon engine, and has a 90-inch wheelbase and an over-all length of 168.4 inches. With the engine mounted forward beside the driver's seat, the new vehicle provides ample pass-through access in the front and flat cargo areas with low 25-inch loading heights in the rear. This pickup weighs 2,389 pounds, has a 73-cubic-foot volume in the box, and can carry payloads up to nearly 1,700 pounds.

FIGURE 14: — The Chevrolet Corvair 95 Rampside pickup enables ease of loading heavy objects from the side. This ramp closes and locks securely flush with the side of the body. Another model of the Corvair 95 series has a rear loading feature. Both have 1,900 pound payload capacity and 80 cubic feet cargo space.

let alone wire or cable!

ARROW STAPLE GUNS can't damage wire or cable because driving blade automatically stops staple at right height! That's why Arrow Staple Guns are proved safer on jobs all over the country. And Arrow staples have tremendous holding power because they're rosin-coated, have diverging points that lock into wood.

T-25 (shown) **for wires up to ¼" in diameter.** (Hi-Fi wire, radiant heating, bell, thermostat, telephone, inter-com, etc.) tapered striking edge gets into tight corners. Uses ¾", ⅝", and ⅜" staples, List $15

T-25B For burglar alarm wiring. Drives staples flush . . . List $15

T-75 For non-metallic sheathed cable, Romex cable or any other object (such as copper tubing) up to ½" in diameter. Uses ⅜", ⅝", and ⅞" Arrow staples . . . . . List $15

ARROW FASTENER COMPANY, INC.

1 Junius St., Brooklyn 12, N. Y.

A Directory for

The Moore Telephone System, Inc.

Printed by

R. R. Donnelley & Sons Company

350 East Twenty-second Street, Chicago 16

FIG. 16: — Station installer for Southwestern Bell Tel. Co., St. Louis, Mo., uses Cushman Truckster to service communications needs of an aircraft manufacturer.

wheeled scooters especially built for their jobs. In traffic congested areas, the scooters have been valuable in delivering supplies to installers and maintenance forces such as PBX installers and maintenance men, teletypewriter men, and building maintenance workers.

These repairmen would ordinarily have to walk around town or use larger vehicles than actually needed for their equipment and type of work. The motor scooter is thus quite useful for carrying the small amount of material needed and for the man's own transportation. They are small enough to be parked downtown without creating a traffic hazard. They are said to have the advantages of low-cost investment and maintenance, ease of maneuverability and ability to park in limited spaces.

Conclusion

IN SPITE of the many advantages claimed for compact cars, the full story is not yet in for these vehicles. No truly valid appraisal of the feasibility of the compacts can be made until they have been on trial for four or five years, the usual trade-in period for motor vehicles.

The big need apparently is for standardization of models with changes made not primarily for appearance, but for improvements in performance, reliability, and adaptability to telephone company uses. There is also a need for ready availability of repair parts. Nevertheless, the new 1961 compacts in the passenger car and truck models are already beginning to prove the worth of this clas of vehicles. — *Dick Reynolds.*

Author's Note: — The manufacturers of the various compact cars have several interesting pieces of literature that describe their products. To obtain copies write TE&M's Reader Service Dept., 7720 N. Sheridan, Chicago 26, Ill. Mention name of manufacturer and product in which you are interested.

New Products' Showcase

SUPPLIES And EQUIPMENT

By DICK REYNOLDS

Chipper Accessories

FITCHBURG Engineering Corporation, reports that a new safety stop switch will become standard on all new models of Fitchburg Chippers. Located at the top of the feed apron, one flip of this switch stops the Chipper within seconds for added safety.

A second switch, also located at the rear for easy use, will give immediate control of the motor without having to move from the feeding position. This solenoid switch will idle the motor between actual feeding operations, decreasing gasoline consumption, and reducing engine wear, and making quieter operation possible. *Check NP* 610.

Two new features of Fitchburg Chippers are the new safety stop switch (located at top of feed apron) and the new solenoid switch for idling the motor (at left rear).

Test Equipment

STEWART BROS. Div. of Instrument Laboratories has added three new units to its line of fully transistorized test equipment.

The Model TE Exploring Coil Amplifier uses only four size Z penlight cells. The case is of bakelite. The coil and phone connections are made to two telephone jacks, one of which turns off battery when the plug is removed. Output is adjustable by knob between the jacks.

It is only necessary to attach receiver plug to one jack on amplifier and exploring coil to the other jack. Any type of receiver will give perfect results as long as it has an impedance of between 40 and 100 ohms at reference level.

The Model TR Voltmeter is completely transistorized and requires no warmup time. The degree of stability of this unit is achieved by use of two independent feedback loops, precision resistors, and printed circuit wiring.

With its high input impedance and freedom from fluctuations, hum and capacitance of power lines, the use of the unit should save time and enable better testing of carrier and communications circuits and equipment.

The Model TO Oscillator is completely transistorized and uses a special Wein Bridge circuit, printed circuit wiring and diode voltage regulation. High stability resistors and condensers are used in the frequency

Exploring Coil Amplifier.

Model TR Voltmeter.

Increase safety and efficiency with **MoPeCo Ventilating Heaters**

MoPeCo Ventilating Heaters provide the underground crews with fresh air or heated fresh air in one portable unit. The Model PE weighs 62 lbs. and delivers 300-800 CFM. Reduces explosion and oxygen deficiency accidents. Get more efficiency from your underground crews. Write for illustrated brochures showing all MoPeCo Models.

ORDER THROUGH YOUR FAVORITE DISTRIBUTOR

Write or Call

MoPeCo **MORRISON-PELSUE CO.**

2001 South Bannock Street • Denver 23, Colorado • RAce 2-2834

determining network to provide long time stability.

The Model TO when used in conjunction with the Model TR provides

Model TO Oscillator.

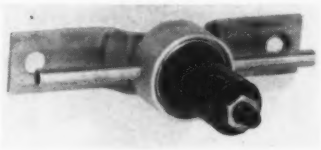
all the equipment necessary to check transmission lines, carrier equipment, sound systems and other types of field and laboratory work.

For complete specifications on all models mentioned. *Check NP* 611.

Relief Valve

A RELIEF valve which automatically bleeds excess air from pressurized toll cables into exchange cables while maintaining a desired minimum pressure in the former, has been announced by George W. Dahl Co.

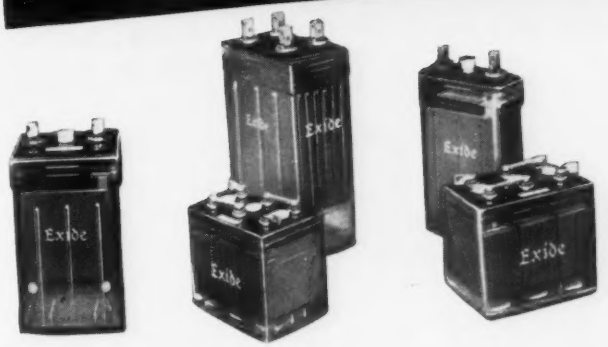
The relief valve consists of a brass body (mounted on an offset bracket) which has an anodized aluminum



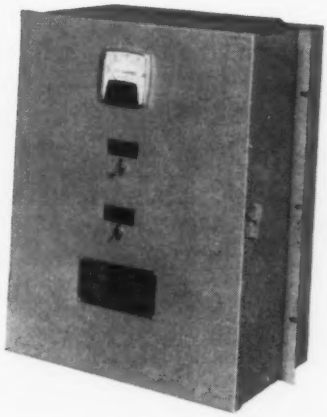
bonnet containing a silicone diaphragm, a spring loaded ball and a spring tension adjusting screw and locking nut.

Depending on the temperature of the atmosphere, these relief valves are set to 5½ to 6 psi in the toll cables to bleed off to the exchange cables. Pressure in the exchange cables is 10 psi at maximum efficiency. When a leak occurs in the exchange lines, it bleeds out of the toll cables but only to 6 psi, keeping toll cables pressurized even at the expense of exchange cables. *Check NP* 612.

Broadest battery line
Pasted plate Tytex with Silvium* or calcium, long-life Exide-Manchex Planté with Silvium, low-maintenance pocket positive nickel-cadmium, and the new 20-year Exide-Ironclad tubular with Silvium.



Most advanced rectifiers
Use silicon diodes for highest efficiency. Range of sizes for all applications.



Coast-to-coast service
Over 200 factory-trained Exide battery and rectifier specialists—fast, capable.

THREE FACTS ABOUT BATTERY ECONOMY

1. Each application has its own requirements

There is no one battery that gives the greatest economy in all applications. But there is one best battery for your application.

2. Rectifiers should match the batteries

It's important that they have enough capacity, but it's wasteful for them to have too much. Proper sizing is an engineering job.

3. Capable service keeps cost down

It prolongs the life of your batteries and rectifiers. Insures lowest cost per year of use. Should be done by trained men.

Only Exide offers the complete power package

This includes batteries, rectifiers and service. It's your easiest way of insuring maximum economy. Write for detailed information. Exide Industrial Marketing Division, The Electric Storage Battery Company, Philadelphia 20, Pa.

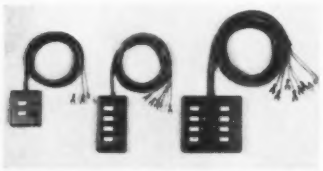
**Silvium is Exide's patented corrosion-resistant grid alloy.*

Exide®

INDUSTRIAL MARKETING DIVISION
The Electric Storage Battery Company
ESB

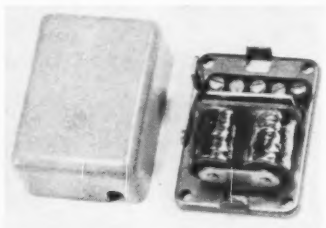
Push-Buttons & Buzzers

NEW PRODUCTS recently announced by Suttle Equipment Corporation are a modern push-button series in one, two, four and eight button sizes, in the new blue-beige



color. The SE-559W (two button), SE-561W (4 button), and SE-565W (eight button) units are available with a 6 foot, 22 gauge cord. Standard Suttle connecting blocks and backboards may be used.

Also available is the SE-7 Buzzer, a signaling unit made under Western Electric Company patent license, for



either A. C. or D. C. operation. The SE-7 Buzzer series is equipped with silver contacts and reed mounted armature with a flat retractile spring and stop. *Check NP* 613.

170 Ft. Communication Tower

ROHN Manufacturing Company has announced a new, 170′ self-supporting communication tower.

The addition of 3 heavy duty 20

foot sections to the basic, self-supporting Rohn design gives the extra height and support needed to increase the rating so it can be used for bigger and heavier jobs. The illustration shows the No. 170 Tower installed to a height of 140 feet. *Check NP* 614.

Loud Ringing Gongs

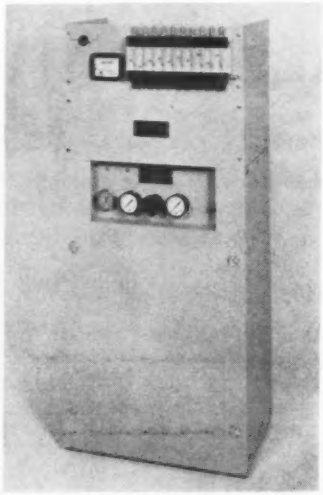
THE 6″ Loud Ringing Gong manufactured by Suttle Equipment Corporation is now available in 6 standard colors — the most desired new color

being fire engine red. The gongs are available in all frequencies normally applied to telephone communications — synchromonic, decimonic, and harmonic. *Check NP* 615.

Model 600 Air Dryers

PUREGAS Equipment Corp. recently introduced a new Air Dryer — the Model 600.

Fully automatic, the Model 600 will deliver 600 standard cubic feet of



dry air per day continuously at adjustable pressures from 0 to 15 psig.

Air drying is accomplished by a combination of compression, refrigeration and chemical absorption principles that reduce the relative humidity of ambient air from 100% at high temperatures to less than 2% at 70°F. for delivery to cable systems.

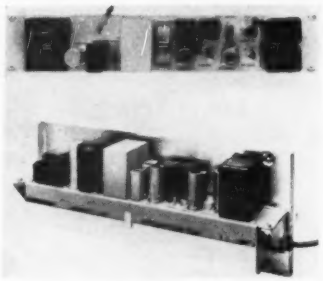
The new air dryer is available with a factory mounted and internally piped meter panel. This feature combined with flexibility of either floor or wall mounting offers the advantages of minimum space requirements and simplicity of installation. *NP* 616.

Divided Ringing Carrier

A NEW divided ringing carrier system for providing two-party, single ringing frequency, subscriber service has been announced by Budelman Electronics Corporation.

Known as Type PLC-DR, the carrier system operates over any existing metallic telephone pair whose attenuation is less than 35 db, without interference with existing physical service.

For each two-party carrier channel, a Model 341B Central Office Terminal and a Model 344A Subscriber Ter-



minal are required. The divided ringing technique used permits selective ringing of the two subscribers served by the same channel.

The new Type PLC-DR subscriber carrier system differs from standard Type PLC carrier in that plug-in, transistorized ringing selection relay circuit module has been added to the subscriber carrier terminal, and a single capacitor has been added to the central office terminal. *NP* 617.

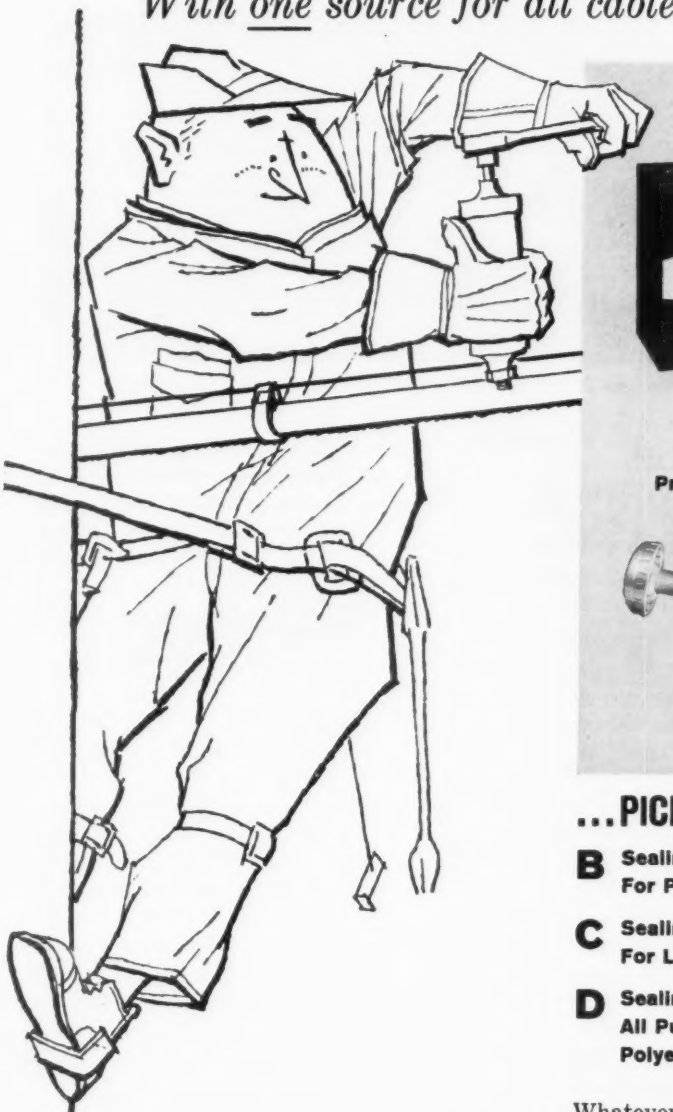
Cable Tool

A NEW Cable Tool No. N-2060, for ring cutting the sheathing of "inside type" plastic fabric or rubber

With GMPCo *it's easy as B, C, D,*

PICK THE PLUG AND THE PACKAGE

With one source for all cable sealing compounds



PICK THE PACKAGE...

Packaged in Can with Activator,

OR...

Prepackaged in disposable plastic Semkit.
Nozzle available for Semkit.

...PICK THE PLUGGING COMPOUND

B **Sealing Compound #G7751**
For Polyethylene Cable

C **Sealing Compound #G7947**
For Lead Cables

D **Sealing Compound #G7837**
All Purpose Compound for
Polyethylene and Lead Cable

Whatever your cable plugging problems, you'll find both the compound and the package you prefer available from General Machine Products. Compounds available in regular and large unit sizes. For full information address your inquiries to the address below.

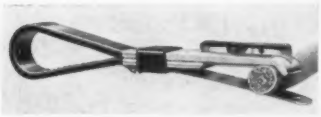
GMPCo **GENERAL MACHINE PRODUCTS COMPANY, INC.**

Old Lincoln Highway At Turnpike, Trevose, Penna.

Distributed by GraybaR

covered cable has been announced by P. K. Neuses, Inc.

Operation is simple. Cable is pushed into tool and against the spring. Back pressure holds the cable against the cutting blade. An accurate



.03125″ deep cut is made when the tool is rotated around the circumference of the cable.

This tool is most practically suited for the customary inside type 3/16″, 1/4″, 3/8″ or 1/2″ cables, but will handle thin sheathed cable up to 1″ diameter. Cuts are always 1/32″ deep in each instance. *Check NP* 618.

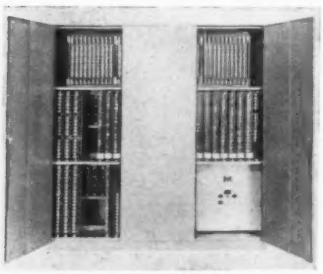
Modern 26-trunk turret used with Leich's 80A-S PABX.

New 80A-S PABX

LEICH SALES Corporation has introduced a new extra-service 80A-S PABX. This 80-line stock PABX offers the same service features as Leich's 40A PABX.

A modern 26-trunk keyset turret lets the attendant extend incoming calls quickly and easily. By depressing three keyset buttons in sequence, she extends these calls.

Inside, outgoing, and city trunk transfer calls are made wthout help from the attendant. Even consulta-



All-Relay Leich Dial System used with Leich's 80A-S PABX.

tion-conference service is a standard feature at no extra cost. Standard dial telephones without special buttons or equipment are used.

The all-relay dial system assures worry-free service, and saves space. Standard and optional service features meet the needs of any business. *Check NP* 619.

Semper-Seal

C & S PRODUCTS Company, has announced that Semper-Seal provides a method of plugging pressurized, lead sheathed telephone and communication cable.

Semper-Seal, a clear, epoxy resin, cable splice and plugging compound enables a water and air-tight seal to be made on paper covered conductors

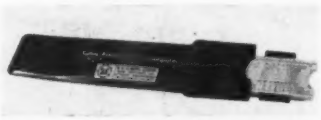
encased in lead. Plugs of this type can be made on aerial or buried cable in wet or dry locations and will remain unaffected by extreme environmental conditions.

Visual proof of an absolute seal is demonstrated (see photo) by a typical lead cable plug with a pressure gage which registers and retains twice the normal operating pressure. *NP* 620.

Pressurization Computer

S & G MANUFACTURING Corp. now lists as Part No. 8266 a Cable Pressurization Computer in its own plastic case.

Unit is composed of three parts, the body, the slide, and the indicator. The body of the computer has two sections, the top section of the body and the bottom section of the body. The two sections of the body are separated by the slide which moves be-



tween them. The indicator is composed of a clear plastic rectangle with a fine line etched on it. This line is referred to as the hairline.

This computer can make the following computations: (a) Compute Flow (SCFH); (b) Compute Pressure Drop (PSI); (c) Compute the Reciprocal of a Pneumatic Resistance; and (d) Compute problems of proportion involving pneumatic resistance, distance, flow and pressure drop. It contains five (5) separate scales. *Check NP* 621.

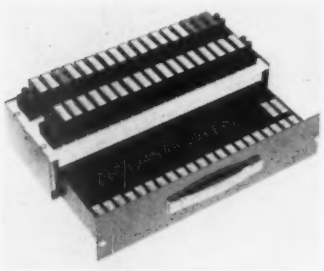
Artificial Line

THE TLA-0100 Artificial Line, from Hallamore Electronics, is a device intended to permit the simulation of the circuit characteristics which may exist in outside plant. The design is such that maximum flexibility is obtained with respect to load distribution, cable characteristics, and termination. Nearly precise simulation of cable characteristics is

achieved through the use of Campbell sections where necessary.

Five types of load modules are available, three of them constituting normal loads of 44, 88, and 175 millihenrys and the other two having 88 millihenrys with one side omitted or reversed. Inductances are held within one percent of the nominal values.

The plug board is arranged to provide two groups of receptacles, 19 in



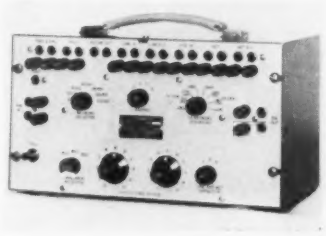
each, with each group connected in series but with no connection between the groups. This arrangement affords the means to establish two separate lines, each of which may be tapped at any point for the simulation of bridged-tap conditions or other faults.

The line is enclosed in a cabinet measuring approximately 19″ x 7¾″ x 4″. A drawer is provided for the storage of the normal module complement. *Check NP* 622.

Test Hybrid Set

THE THS-0100 Test Hybrid Set, from Hallamore Electronics, is an instrument which incorporates the necessary transformers, balancing networks, access jacks and switching for performing all standard measurements of return loss and for adjustment of building-out capacitance or compensation on telephone cable circuits.

All of the commonly required capabilities are embraced by the THS-0100. The full complement of balancing networks includes compromise networks for 600, 900 and 1500 ohms as well as precision networks for 19H88, 22H88 and 24H88 loaded circuits. The precision networks are identically equivalent to the Western Electric 115H and 115AL networks. The strapping options of these networks are available on a switched rather than a soldered-strap basis. Four-wire pads of 1, 2 and 3 decibels and line and net capacitors of 1, 2 and 4 microfarads are provided. A two-section capacitance decade ranging from .001 to .11 microfarads is included for the adjustment of line or net build-out. An inductor (44 mh



loading coil) is used in conjunction with the capacitance decade to constitute an impedance compensator.

The instrument is completely self-contained in a housing which measures 13″ x 7″ x 6″ with the cover in place. The hinged cover may be removed for convenience. A leather instrument handle provides easy portability. *Check NP* 623.

NEW PRODUCTS DEPARTMENT **4-15-61**
Telephone Engineer Publishing Corporation
7720 North Sheridan Road, Chicago 26, Illinois **Date**.....

ATTN: Dick Reynolds

Please send me additional information concerning the following New Products

NP 610.....	NP 611.....	NP 612.....	NP 613.....	NP 614.....
NP 615.....	NP 616.....	NP 617.....	NP 618.....	NP 619.....
NP 620.....	NP 621.....	NP 622.....	NP 623.....	NP 624.....

NAME ..... POSITION .....
COMPANY .....
ADDRESS .....
CITY ..... ZONE..... STATE .....
I am a subscriber to TE&M. ☐ Yes ☐ No (check one)

Quality pays

in a TRENCHER

AUBURN

IS BETTER BUILT TO GIVE YOU
MORE PERFORMANCE

You get more trench for your money—day in and day out—and at less cost with an AUBURN. Simple and rugged in design, it's virtually trouble-free. Its variable hydraulic drive automatically adjusts the speed to changing soil conditions. One man operates it digging up to 800′ per hour, 6″ to 14″ wide and down to 6′ deep.

Job proven . . . AUBURN is the first choice of contractors, utility and telephone companies throughout the world. It is the most profitable trencher you'll ever own, ask any AUBURN owner . . . he'll recommend it.

Write us for literature and the name of your nearest AUBURN dealer.

AUBURN MACHINE WORKS, INC.
2035 South J Street, Auburn, Nebraska, U.S.A.
Phone: BRidge 4-3141

Order Your Personal Copies of TE&M Today

If you do not receive your personal copy of each issue of TELEPHONE ENGINEER & MANAGEMENT, why not enter your Personal Subscription sent to your home or office?

1 Year-24 Big Issues-$4.00

TELEPHONE ENGINEER & MANAGEMENT
7720 Sheridan Road
Chicago 26, Illinois

Please send TELEPHONE ENGINEER & MANAGEMENT to me for 1 year.

Name (Please Print)

Title

Company

Street Address or Box Number

City Zone State

Telephone Industry News Highlights

COAST-TO-COAST REPORTS

United Utilities, Inc. reports record earnings for 1960 . . . Gains recorded by Inter-Mountain Tel. Co. . . . Major personnel changes reported by four General Tel. companies . . . Lincoln T. & T. reports 1960 was "busiest, most significant year" . . . Nation's telephone companies report on 1960 operations.

United Utilities, Inc. Boosts Earnings in '60: Consolidated Revenues Set New Record

UNITED UTILITIES, INC., Kansas City, Mo., a system of 23 companies operating throughout the country and providing various utility services to some 550 communities, established records in revenues, earnings, customer growth and construction during 1960, the annual report disclosed.

While revenue gain was a major factor in the improved earnings of 25 per cent over 1959, the conversion program from manual to dial operations provided economies and added to the net income, C. A. Scupin, president, told shareholders. At the end of 1960, the conversion program was 75 per cent completed; by the end of 1961 the figure will be 92 per cent, and in the following year all exchanges will be dial operated.

Net income available for dividends and surplus in 1960 amounted to $6,156,765, equal to $2.42 a common share on the 2,545,364 average number outstanding, compared with $4,921,303, or $2.09 a share on the 2,350,378 average shares in 1959.

Consolidated revenues of $47,174,539 compared with $42,442,240, a gain of 11 per cent. Telephone revenues were $41,540,267; power, water and natural gas revenues were $4,063,000; propane and merchandising revenues totaled $1,571,272.

The main factor in the telephone revenue rise was the increase of some 22,000 stations and rate adjustments in two states — Iowa and New Jersey. Of the increase in subscribers reported, 5,250 came through acquisition, principally through the Northwest Telephone Company. Telephones served December 31 were 488,922, against 466,607 a year earlier. United Utilities is the second largest Independent telephone system in the U. S.

The company spent about 25 million dollars last year and has scheduled construction projects totaling $26.5 million for 1961. When the present dial conversion and modernization program is completed next year at a cost of 70 million dollars for 1959, 1960 and 1961, future additions will taper off considerably, Scupin said.

Financing last year was provided by the sale of 5 million dollars of debentures by the parent and $7,800,000 of first mortgage bonds by subsidiaries. The subsidiaries have obtained commitments for the sale of $5½ million of bonds this year.

"Prospects for the utility industry in general — and for the United System in particular — are most favorable," Scupin said. "The influx of family units and industry into our service areas and the provision of new and expanded services hold promise of significant growth."

Stockholders were asked at the annual meeting on April 4, 1961 to approve a split of the present common stock on a 2-for-1 basis. Mr. Scupin said that favorable action on this proposal would tend to broaden the distribution of the company's stock and thereby assist the continued growth of the System.

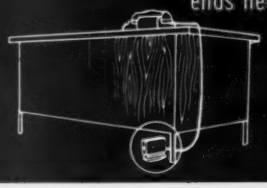
Consolidated assets of United Utilities December 31 were $166,941,871, against $149,573,232 a year earlier.

Gains Recorded By Inter-Mountain Co.

DESPITE the leveling off nationally in the general economy, Inter-Mountain Telephone Co., Bristol,

FLOOR-CON TELEPHONE FLOOR CONNECTOR

keeps desks free from all telephone equipment . . .
ends needless marring of office furniture

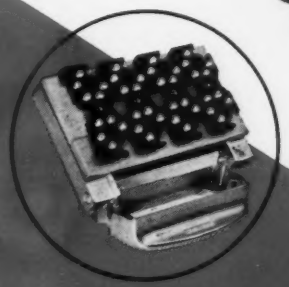


gives you beauty, uniformity and economy!

Floor-Con allows all telephone installation work to be completed in advance of moving. All wiring is concealed. Approved and specified by telephone companies, Floor-Con is used exclusively in many large buildings in business, industry and government. Floor-Con attaches to all types of underfloor duct systems, flush type floor boxes, single conduits, through the floor—or if conduits are not provided, screws directly to the floor.

Comes in four plated finishes: Chrome—satin or bright, and Brass—satin or bright.

All necessary fittings will be supplied to adapt Floor-Con to your particular duct system or floor installation—please specify the type or make in use.



MODEL 104 shown with standard telephone equipment, accommodates up to 8 No. 44-A Connecting Terminals (4 on each side).

MODEL 102 accommodates up to 6 No. 44-A Connecting Terminals (3 on each side).

(Pat. No. 2854166)

For catalog information and prices, write:

FLOOR-CON Dept. -TM
759 North Spring Street / Los Angeles 12, California / Telephone: MAdison 4-5400

Tenn.-Va., "continued to grow," last year, President Kelley McNish pointed out in his annual report. Toll traffic in 1960 was 7.7 percent above the rate of 1959, and the gain of 7160 telephones represented a 6.74 percent growth. The company, which completed its dial conversion program in 1959, spent $4,257,582 on construction last year, compared with $6,247,280 the previous year.

Operating revenues last year totaled $9,185,632 an increase of $876,986, or 10.6 percent, over 1959; total operating expenses, exclusive of taxes, were $4,872,404 in 1960, an increase of $269,298, or 5.9 percent over 1959; net income was $1,318,695 last year, compared to $1,107,490 a year earlier. Earnings per share were 92 cents in 1960, against 83 cents in 1959.

Major Personnel Changes Announced By Four General Telephone System Companies

WILLIAM C. ROWLAND became operating vice president for General Telephone Co. of Ind., effective April 3. Rowland, who was operating vice president for General Telephone Co. of Wis., succeeded J. F. Van de Vusse, who became director of public relations for the Indiana company.

On the same date, John F. O'Connell, general plant manager of General Telephone Co. of Pa., succeeded Rowland as operating vice president for General Telephone Co. of Wis.

Eugene L. Langley, former division plant superintendent, General Telephone Co. of the Southwest, became general plant manager for General Telephone Co. of Pa., on April 3.

Marvin C. Diefendorf, former director of public relations for the Indiana company, has joined the New York headquarters public relations staff of General Telephone & Electronics Corp.

Born in New Castle, Pa., Rowland was graduated from Westminster College in 1949 with a Bachelor of Science degree. He was associated with the Bell Telephone Co. of Pennsylvania before joining the General System as plant engineer for General Telephone Co. of Pa. Rowland subsequently held numerous positions in the engineering department of the Pennsylvania company, becoming general plant manager, with headquarters in Erie, in 1956. In 1958 he became operating vice president for General Telephone Co. of Wisconsin.

A veteran of more than 31 years in the telephone industry, Van de Vusse is a native of Allegran County, Mich. He served with Tri-County Telephone Co., South Haven, Mich., in various positions in the commercial department, and was division commercial manager for that company when, in 1943, he became general manager of Atlas Advertising Co.,

Fort Wayne, Ind., now part of General Directory Co. In 1947, Van de Vusse became general manager and director for Union Telephone Co., Owosso, Mich., a predecessor company of General Telephone Co. of Mich. He became president and director of Illinois Telephone Co., Bloomington, Ill., a predecessor company of General Telephone Co. of Ill., in 1958. Van de Vusse became operations vice president for General Telephone Co. of Indiana in 1956.

O'Connell was born in Madison, Wis., and was graduated from University of Wisconsin with a B.S-E.E. degree in 1947, after previously attending Notre Dame and Leland Stanford universities. He served with the Commonwealth Telephone Co. in Madison, a predecessor of General Telephone Co. of Wis., before transferring to General Telephone Co. of Ill., where he subsequently served as plant engineer, maintenance superintendent, and chief engineer. In 1959, O'Connell transferred to General Telephone Co. of Pa. as chief engineer, and last year became general plant manager for that company.

Langley was born in Beaver, Okla., and attended Texas A & M College. He joined the General System in 1948 in the plant department of General Telephone Co. of the Southwest. He held various positions in the plant department, subsequently becoming general equipment supervisor in San Angelo, Texas, in 1954, and division plant superintendent in Sherman, Texas, in 1959.

Born in New Haven, Conn., Diefendorf attended Misouri Valley College. He joined the General System in 1949 as commercial representative with General Telephone Co. of Calif. He subsequently held various positions in the commercial and public relations departments of that company before transferring to General Telephone Co. of Ind. as director of public relations in 1957.

Birch Named Traffic Director For GT&E Service Corp.

LEO A. BIRCH, traffic administrator for GT&E Service Corp., has been named traffic director, Walter G. Wright, vice president-operations, announced last month. Birch succeeds Allen W. Pyrke, who passed away March 12.

Birch was born in Elizabeth, N. J., and attended Rutgers University. He was associated with the Western Electric Co., Newark, N. J., before joining the General Telephone Co. of Calif. in 1949. Birch held numerous positions in that company's traffic department, and was division traffic superintendent at Santa Barbara when he was transferred to GT&E Service Corp. as traffic administrator in 1958.

Lincoln (Neb.) Tel. & Tel. Co. Reports 1960 Was "Busiest And Most Significant Year"

THE "busiest and most significant year" in the history of The Lincoln (Neb.) Telephone & Telegraph Co. was reported last month by President Thomas C. Woods, Jr. at the company's annual stockholders meeting.

The company gained 6,381 telephones during the year, which was 2,237 more than in 1959, and the second largest net gain of any year of its 57 years of operations. At year end Lincoln Tel. had 148,608 telephones in service. Exchanges at Hebron and Douglas were converted to dial operation and dial systems at Mead, Crab Orchard, Union, Sutton and Waverly were replaced with larger units. On December 31, 1960 the company was operating 107 dial and 19 manual exchanges and 87 percent of its telephones were dial. A total of 6,169,254 long distance messages were completed.

Nationwide direct distance dialing was installed at Lincoln, Beatrice, Auburn, David City, Hebron, Wahoo and 38 other exchanges. The eight-story general office and equipment building at Lincoln was completed and buildings were completed at Hebron and Sutton. Construction of a new building at York was started. The Lincoln warehouse was remodeled. Substantial central office equipment additions were made at Lincoln, Hastings and Beatrice and several smaller exchanges. During the year, 157 long distance circuits were added, including 58 between Lincoln and Wahoo.

Fourteen long distance switchboard positions were installed at Lincoln and mobile telephone service was placed in service at Hastings. Land

WHEN CHECKING CIRCUITS

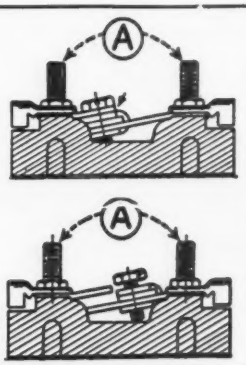
Simply Connect Indicating Instrument to Terminals of Block. Drop Link, and Check. That's all!

THE STATES COMPANY

Sliding Link
NT TERMINAL BLOCKS

Widely used on long line service. All testing done without touching permanent wiring.

THE STATES COMPANY DEPT. TE
New Park Ave., Hartford, Conn.



A. Just attach instrument to terminal posts.

B. Slide link out of contact — take reading.

C. Slide link back and bolt in position.

ACHIEVERFONE

designed for tomorrow —available today!

Within the next few years, the use of common carrier radiotelephones will double — perhaps even triple! However, as traffic increases, many existing types of mobile phones with only one or two frequencies will become obsolete.

AC considered this when designing their 150 Mc mobile radiotelephone . . . the AChieverfone. The result was not one or two frequencies, but four frequencies which are selected by easy-to-operate pushbuttons on the control head. This means that with a four-channel AChieverfone there is no waiting for a channel to clear, no relayed messages, no call-backs . . . your customers can call or receive calls from all business and household telephones.

Feature for feature, AChieverfone is the best common carrier MRS system available. It costs less, takes less time to install and is compatible with all existing equipment. For more information, write or call AC today.

SPECIFICATIONS—FCC Type Accepted

Transmitter: 144-174 Mc, 4-Channel

RF output: 22.5 watts into 52 ohm load

Receiver: 144-174 Mc, 4-Channel

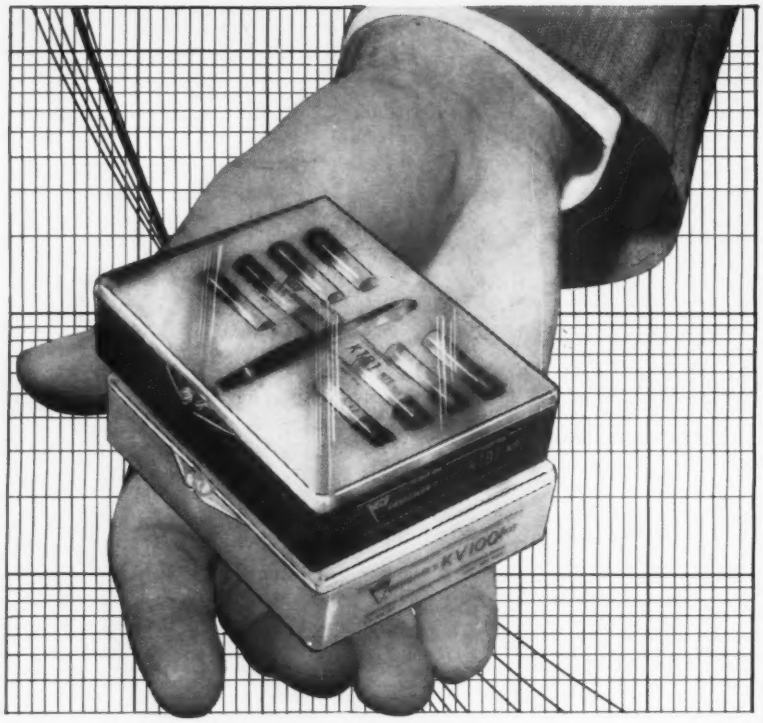
Wide Band (60 kc) or Narrow Band (30 kc) models available (Bands quickly converted to Narrow or Wide by substituting IF filter)

Frequency Stability; within 0.0005%

Selective Signaling; 51,000 five-digit (compatible, 2-tone sequential) codes available

Size: Receiver-Transmitter, 21⅛" x 8⅞" x 6¼"

Weight: 35.5 pounds, including receiver-transmitter, control head and cable



THE MOST RELIABLE SOLUTION TO MANY ELECTRONIC PROBLEMS CAN BE FOUND IN THE PALM OF YOUR HAND WHEN YOU USE...

VECO THERMISTORS AND VARISTORS

What better way to prove to yourself the reliability of VECO **Thermistors** and **Varistors** than by testing them under the actual environmental conditions in which they are to be used? VECO Thermistor and Varistor Circuit Design Kits give you the opportunity of doing this to your complete satisfaction. In kit form they cost so much less — and each kit presents a full range of resistance values of the various bead, disc, rod, and washer type Thermistors or a wide assortment of standard Varistors. Here's your opportunity to put stock Thermistors and Varistors through your toughest quality control tests. Once you've tried them you'll agree —VECO is the leader in reliability.

KD 25	Thermistor Disc Kit—13 VECO Discs	$12.50
KP 50	Thermistor Glass Probe Kit—6 VECO Probes	14.50
KR 75	Thermistor Rod Kit—8 VECO Rods	9.50
KTB1	Thermistor Bead Kit—8 VECO Beads	19.50
KW125	Thermistor Washer Kit—12 VECO Washers	13.50
KV100	Varistor Kit—8 VECO Varistors (assorted types)	14.50
KV1001	Varistor Kit—9 VECO Varistor Discs	7.50

ABOVE ITEMS SENT PARCEL POST POSTPAID

Other VECO Products:
Thermistors • Varistors

Chopperettes • Combustion Analyzers • Thermistors, Catheters and Needles • Matched Thermistors • Thermal Conductivity Cells Hypsometers • LOX Thermistors — any many others.

VECO glass enclosed thermistors are not adversely affected by radiation. Our quality control processes are accepted under MIL-Q-5923 standards.

FREE:
To learn more about VECO Circuit Design Kits write for folder SE102

Cataloged in EEM and Radio Master

VECO VICTORY ENGINEERING CORPORATION

600 SPRINGFIELD ROAD, UNION, N. J. • MUrdock 8-7150

was purchased at Unadilla and Union for new buildings, and negotiations were under way at year-end to purchase land near Clatonia and Alexandria to be used as repeater stations for the proposed Lincoln-Hebron microwave system. Substantial requirements were installed for missile bases and other military communications.

Operating revenues for 1960 were $14,514,218, an increase of 9.11 percent over 1959. Operating expenses, excluding operating taxes, increased 9.68 percent to a total of $9,828,332. Federal income, state and local taxes for 1960 were $2,372,990, or $223,063 more than in 1959.

Operating income available for dividends was $1,504,963 which was $75,962 less than in 1959. Earnings per share of common stock outstanding at year-end 1960 were $4.11 compared with $4.77 at year-end 1959. Woods said that lower earnings last year reflect expenses due to heavy storm damage resulting from severe winter conditions and costs of moving equipment and other facilities at Lincoln from the 14th and M streets building at 15th and M.

Net additions to plant in 1960 were $4,468,838, and at year-end total plant in service had increased to $55,173,414. Plant under construction came to $511,049. Average plant in service per telephone increased from $336.57 at the end of 1959 to $362.65 at the end of 1960.

President Woods announced the election of the following directors: Burnham Yates, president of the First Continental Bank & Trust Co., Lincoln; and William W. Cook, Sr., president of the Beatrice National Bank, Beatrice.

Company directors re-elected were Thomas C. Woods, Jr., Merle M. Hale, H. W. Potter, Frank H. Woods, Charles T. Stuart, William I. Aitken, Philip M. Aitken, W. W. Putney, Henry C. Woods, E. J. Faulkner, Morton Steinhart, and T. H. Wake.

The annual directors meeting followed the stockholders meeting. Corporate officers re-elected were Frank H. Woods, chairman of the board; Thomas C. Woods, Jr., president; Merle M. Hale, vice-president-operations; William I. Aitken, vice presi-

dent and general counsel; Houghton Furr, secretary and treasurer; Bruce J. Sievers, controller; and Harlan W. Cane, assistant secretary and treasurer. Operating officials re-appointed were K. L. Lawson, general commercial superintendent; M. C. Walker, general plant superintendent; L. W. Cleveland, general traffic superintendent and personnel director; R. K. Ghormley, chief engineer and B. A. Isaman, supervisor of planning.

California Water & Tel. Reports Earnings Decline

CALIFORNIA Water & Telephone Co. reported last month that earnings per share of common stock amounted to $1.94 last year, compared with $1.98 per share in 1959. Operating revenues were $28,344,438 in 1960 and $25,245,373 a year earlier; while net income was $4,223,943 and $3,907,440 for the two years, respectively. The company had 163,644 telephones by the end of last year, compared with 154,469 in 1959.

The report of Western Utilities Corp. showed earnings per average share in 1960 of 47 cents, against 43 cents in 1959.

The Board of Directors of the latter company has declared a regular quarterly dividend of nine cents per share on the common stock.

Bell Of Canada Had 6% Return Last Year

BELL Telephone Co. of Canada had net income in 1960 of $53,511,907, equal to $2.52 per share, compared with $50,283,578, or $2.48 a share in 1959, President Thomas W. Eadie said in his annual report to stockholders. The 1960 earnings represented a return of 6 per cent on invested capital.

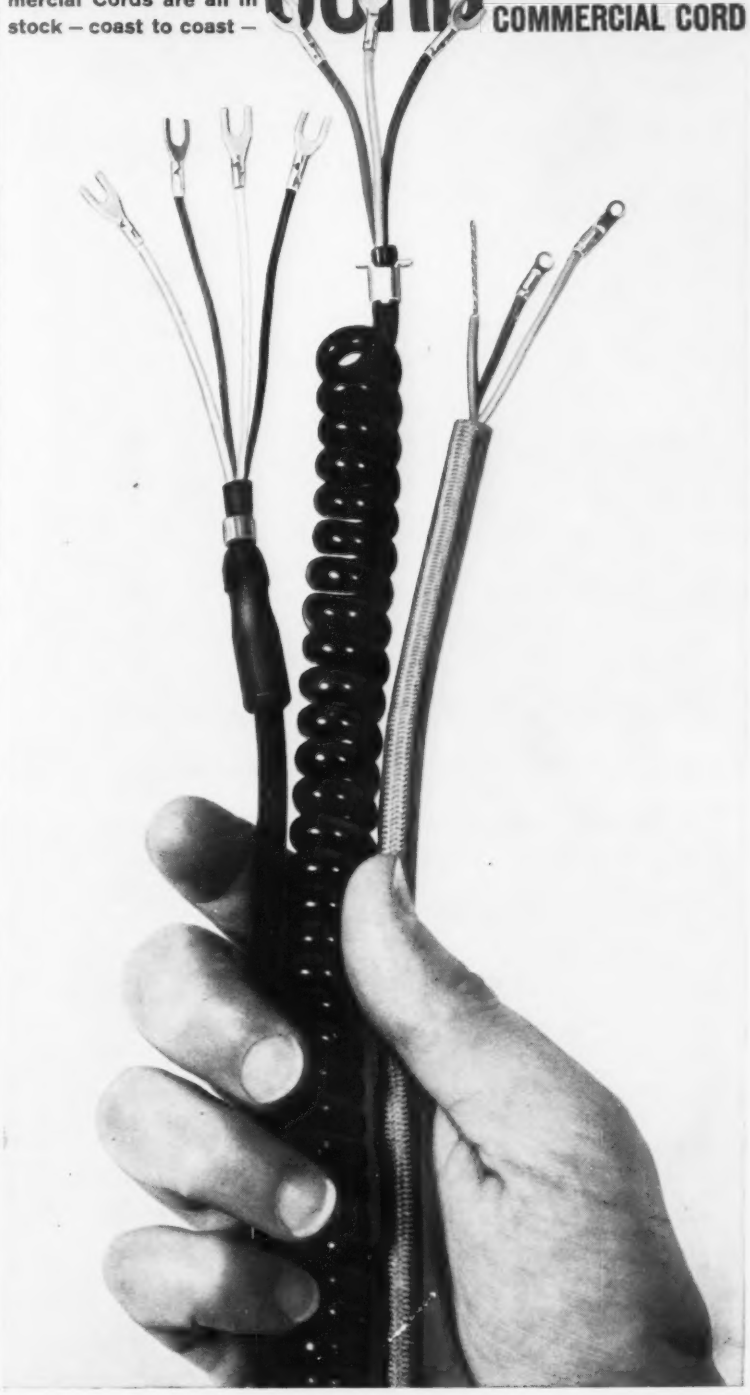
"Reflecting a slowing down in the national economic progress, revenues were only 7.5% higher than in 1959," Eadie noted. "Expenses increased by 5.5% . . . The two major revenue components — local service and long distance service — each by 7.3%. Other revenues rose by 9.7%."

Operating revenues for the year totaled $404,848,423, compared to the 1959 total of $376,604,645. Operating expenses amounted to $270,428,-

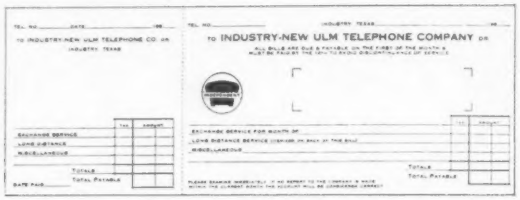
...any cord. Commercial Cord has it! Patch cord, test cord...phone or intercom...straight cord or Spiraflex®...nylon jacket or colored PVC...standard, or any length or termination—Commercial Cord makes them all! ■Want cords fast? Commercial Cords are all in stock—coast to coast—for fast shipping to you. ■Get catalog, samples, prices from Commercial Cord Co., Clifton Springs, N.Y. Distributed by: Leich Sales Corp., 427 W. Randolph St., Chicago 6, Ill.; Automatic Electric Sales Corp., Northlake, Illinois

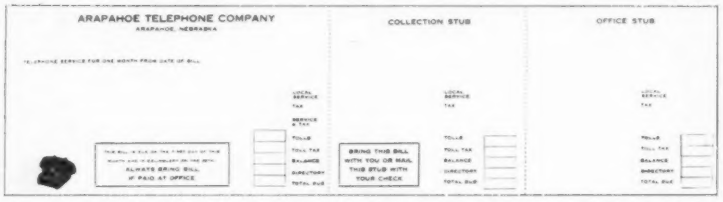
PiCKa CORD

COMMERCIAL CORD



SUTTLE QUALITY TELEPHONE SUBSCRIBER BILLS





REDUCE SUBSCRIBER BILL COST by using Suttle printed bills! **The Suttle Press** furnishes subscriber bills in all the following types:

- **NCR paper** (no carbon required)
- **One-Time Carbon**
- **1, 2, or 3 stub bills on various grades of paper — To Your Specification!**
- **Carbonized bills** (with 1, 2, or 3 stubs)
- **Pre-numbered, perforated, dated month by month, special sizes**
- **Other special bills as required**

SUTTLE PRESS SUBSCRIBER BILLS are designed to be used in Suttle's low cost billing envelopes — window or panel types to eliminate addressing.

SEND US TODAY bill and envelope samples you are now using for our prompt, low cost quotation, or send us your order today!

Write **NOW** for Suttle's complete catalog of printed forms **IN STOCK** — Get this valuable catalog for daily use in your operation — **FREE!**

SUTTLE PRESS **Phone 782**

A Division Of
Suttle Equipment Corporation **Lawrenceville, Illinois**

499, and taxes totaled $64,731,000 last year. The number of telephones in service at the end of 1960 was 3,515,007, an increase of 184,310 during the year.

P. A. Lasley Dies

P. A. LASLEY, executive secretary and general counsel of the Arkansas Telephone Association, died March 24 in a Little Rock hospital after a short illness. He was a partner in the law firm of Lasley & Lovett, Little Rock.

"Judge," as he was affectionately known throughout the telephone industry, was the author of the bill creating the Department of Public Utilities, now the Arkansas Public Service Commission, and was its first chairman under the administration of the late Governor Marion Futrell. He had specialized in the field of utility law and was well known throughout the South.

He was born in Pocahontas, Ark. in 1886 and was a graduate of Bethel College, Russellville, Ky. He studied law in his father's law office and was admitted to the bar in 1909. He was a member of the First Presbyterian Church, the Pulaski County, Ark., American and Federal Power Bar Associations, and was a Phi Gamma Delta.

The late Gus Lane of Russellville, John Carter of Smackover, Judge Lasley and a representative of the Bell System were responsible for the first loans made to Arkansas Independents in 1950 that paved the way for the accelerated progress the state has made in dial conversions and station gains. "Judge" was an untiring worker in the telephone industry of his native state and his ready wit and sound advice will be sorely missed.

Survivors include his widow, one daughter, a brother, sister and two grandchildren.

Substantial Progress Reported By Cincinnati & Suburban

THE successful selling of new services, greater use of long distance, and effective expense controls contributed to substantial progress for the Cincinnati & Suburban Bell Telephone Co. in 1960, President B. L. Kilgour,

Gould Stationary Battery Jars Won't Crack or Break

During shipping and handling, you can be sure that the outer jar—and the battery itself—will remain unharmed despite abuses normally encountered in receiving and installing stationary batteries. New Gould Plastrite Jars have a higher tensile strength, will resist more impact than ever before.

Lighter, smaller, more resistant to heat. New Plastrite Jars are the perfect outer cover for your Gould Stationary Battery. Less weight makes them easier to handle; reduced size saves up to 40% floor space; higher heat-resistance and better elongation characteristics eliminate bulging, warping, and loss of shape.

Redesigned inside and out. Plastrite Jars are one of many new advances made in Gould Stationary Batteries . . . batteries with quick, reliable current when you need it for either full float or cycle operation. Contact your Gould representative and ask him for the complete story on Planté, Calcium or Kathanode batteries. Call or write your local Gould office listed under "Batteries—Industrial" in the Yellow Pages. Gould-National Batteries, Inc., First National Bank Building, St. Paul 1, Minnesota. In Canada, write to Gould-National Batteries of Canada, Ltd., 1819 Yonge Street, Toronto, Ontario.

New Stationary Batteries in Plastrite Jars offer the same long life for which Gould has always been famous.

***More Power to You from* GOULD**

with a *Truco* 8000 lb. Center Mount Derrick

Never underestimate the power of a Truco turret derrick — especially the new compact Universal Center Mount Derrick. Here is a ruggedly built, all around utility tool that lifts, digs, puts a man in the air, sets a pole and installs the hardware. You mount it behind the cab of any standard line body in only 16" of space*. You get 360° rotation of the box-type steel telescoping booms from dual unitized controls. You lift up to 8000 pounds of payload with smooth hydraulic operation while twin hydraulic outriggers keep your vehicle Gibraltar steady.

You'll be able to dig those holes that just couldn't be dug before, too. Truco's new 4-speed hydraulic digger has three conventional speeds plus a brand new super low speed for biting through shale, caliche and hardpan — even anchor holes are possible with ease at *any* angle, in *any* direction. For aerial lift use, add a fiberglass safety basket with airplane-type single stick control.

Before you buy, insist on seeing this multi purpose utility tool in action. Investigate the savings *you* can make on *your* utility jobs — in dollars, manpower and time. See your Truco dealer or write for details.

**Also available for corner mount installations.*

TRUCK EQUIPMENT COMPANY

"The COMPLETE Line of Utility Equipment"

3963 Walnut Street / AC 2-7905 / Denver 5, Colorado

Jr., said in the annual report sent to stockholders last month.

Telephones in service increased 19,558 to a total of 587,675. Long distance calls increased 9.4% and local calls reached a new high of 2,600,000 average per day. These gains along with acceptance by customers of new services for home and business produced operating revenues 7.4% higher than in 1959.

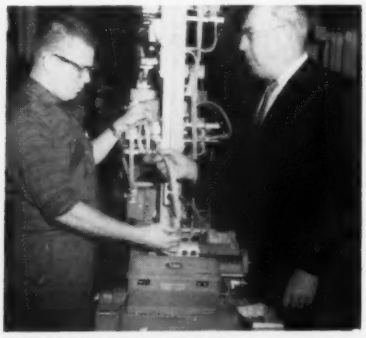
The company spent a record $17,000,000 on construction last year, and "substantial sums" will be spent in 1961, Kilgour stated.

Per share earnings averaged $5.89 in 1960, compared with $5.57 the previous year. Greater wage costs and depreciation on a larger plant investment were primarily responsible for an increase in operating expense of 7.9%, the report noted. Taxes totaled $12,200,000, not including the 10% federal excise tax which totaled $5,600,000.

Revenues totaled $54,408,000 last year, compared with $50,656,000 a year earlier; expenses were $32,567,000 and $30,195,000 in the two years respectively; and net income was $8,096,000 in 1960, against $7,662,000 in 1959.

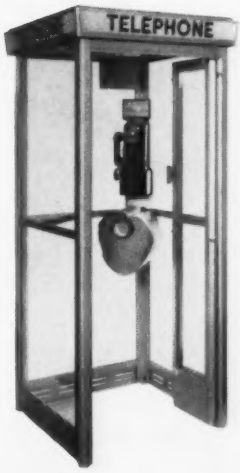
United Tel. Completes Bedford, Pa. Cutover

YEARS of study, engineering and planning followed by months of fabricating, building constructing, assembling and installing at a cost of nearly one million dollars paid off in the small hours of a recent February Sunday morning, when William



WILLIAM HAGSTROM, right, district manager for United Telephone Co. of Pennsylvania checks perforated tape with JAMES MULLIGAN, General Dynamics Electronics installer at Bedford, Pa., DDD installation.

PROVED BEST for visibility



With only one divider rail on each side and with slim corner posts, you (and your clients) have the maximum in "seeability" —in or out.

the BN Booth

For full particulars, consult your distributor or write direct ...
Benner-Nawman, Inc., 3421 Hollis Street, Oakland 8, California.

a B-N booth is a busy booth!

CM PULLER

for RUGGED STRENGTH and GREATEST NUMBER of USEFUL FEATURES

CAPACITIES FROM 3/4 TO 6 TONS

LIFETIME LUBRICATED

Lifts or pulls in any position

SMOOTH OPERATION
Easy operating, accurate spotting, effortless lowering.

POSITIVE BRAKING
Holds load automatically with non-slip action.

RUGGED CONSTRUCTION
Built of heat treated alloys of steel and aluminum.

SUPER-STRENGTH CHAIN
Famous CM-Alloy link chain; long-lasting, non-kinking, self-cleaning.

• *Send for bulletin and name of your local distributor*

CM HOISTS

CHISHOLM-MOORE HOIST DIVISION
COLUMBUS McKINNON CORPORATION
TONAWANDA, NEW YORK
NEW YORK • CHICAGO • CLEVELAND
In Canada: Columbus McKinnon Limited, St. Catharines, Ontario

TYPE 16-B MULTI-STATION 7-CHANNEL CARRIER
is your low-cost answer!

Budelman Type 16-B Carrier will:

- Provide additional circuits on existing multi-station lines.
- Provide additional circuits on new multi-station lines.
- Improve service on existing multi-station lines.
- Provide new circuits to new stations in areas beyond the 1200 ohm loop.
- Provide additional trunks to remote PBX, PABX, or key telephone systems.

FULLY SELECTIVE 10-PARTY DIVIDED RINGING
SEMI-SELECTIVE 10-PARTY BRIDGED RINGING
SINGLE FREQUENCY CODED RINGING

all this without additional wire lines —without disturbing existing services!

7 Channels — 10 to 140-kc freq range. Applicable wherever attenuation at carrier frequencies does not exceed 35-db.

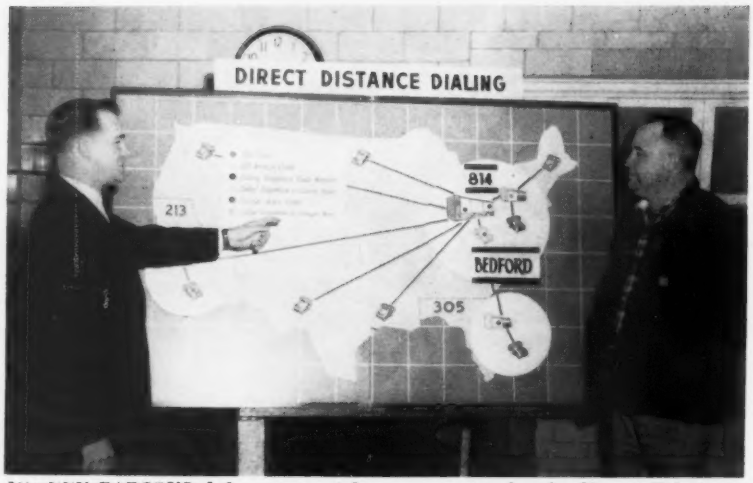
Write for Bulletin 259-D — or call us

BUCKEYE TELEPHONE & SUPPLY CO.
1250 Kinnear Rd. • Columbus 21, Ohio
Phone—HUdson 8-0655 (Area Code 614)

Hagstrom, Bedford (Pa.) district manager for the United Telephone Co. of Pennsylvania gave the signal which converted the Bedford telephone exchange from manual to dial operation.

In preparation for the changeover to dial service, the United Telephone Co., and the Stromberg-Carlson Co. had crews, which at times numbered nearly 100 men, working on the dial exchange project. In addition to changing and renewing customers' telephone apparatus and installing automatic switching equipment, the telephone company expanded its cable network to over 80 miles of storm-proof cable, much of it underground conduit, to provide facilities to fulfill the demands for telephone service in the area.

To acqaint telephone users with the correct method of using the new equipment, the telephone company conducted an extensive educational program including instruction pamphlets, newspaper advertising and "live" dialing demonstrations. It is estimated that 3,500 persons including 2,000 school children participated in the dialing demonstrations conducted for the telephone company by District Manager Hagstrom, John Parsons and William Shank, of United's commercial department staff.

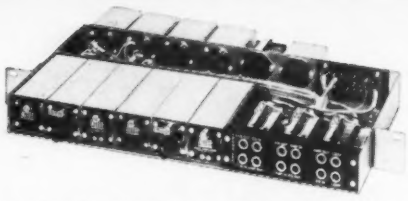


JOHNNY PARSONS, left, commercial representative for the United Telephone Co. of Pennsylvania instructs Bedford fire chief on some of the finer points of the new DDD system.

Customer dialing of long distance calls on a continental-wide basis was introduced in March, according to Manager Hagstrom. The system permits Bedford telephone users to dial direct to telephones in Altoona, Everett, Harrisburg, Chicago, Los Angeles, and approximately 9,000 other cities and towns in the United States

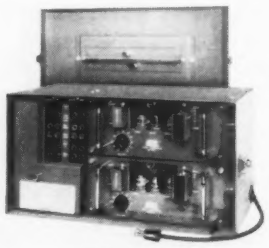
Call for ALTEC'S LINE of proven communication equipment

© 1960 Altec Lansing Corporation

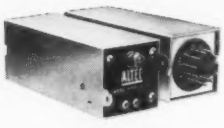


7300 Telephone Repeater Term Unit, fully complemented

ALTEC "Quick-Fix" Termination Bay



S-17 Amplifier System



455A Amplifier

CHECK YOUR NEEDS FROM THIS LIST

- 453A transistor type repeater amplifier for use on 24-26 volts.
- 455A transistor type repeater amplifier for 48-52 volts.
- 529 power supply designed to power 100 transistor type amplifiers from 110 volts AC.
- 533 power supply designed to power 1 transistor type amplifier from 110 AC. Contains bracket for amplifier.
- A series of equalizers for frequency correction for loaded, non-loaded, and open wire circuits.
- 460A transistor type compressor amplifier, interchangeable with 453-455 type.
- A series of brackets and trays to hold amplifiers and power supplies.
- 7300 telephone repeater panel which may be used for 2 wire-4 wire, 2 wire-2 wire, or 4 wire-4 wire applications, and is equipped with test circuit jacks and accommodates the following plug-in items on standard 19" relay rack—1 rack unit of 1¾" height:
  - Transistor type amplifiers
  - Frequency correction equalizers
  - Hybrid coils
  - Compromise and precision balancing network
  - Relay for loss pad relay switching
  - 4-wire loop back relay for routine testing
  - Repeat coils for simplex or composite signaling
- S-17 program amplifier, best quality amplifier for program circuits.
- A series of microphones, amplifiers, loudspeakers for PA systems.
- A series of hybrid and repeating coils.

ALTEC LANSING CORPORATION

ALTEC Lansing Corporation Dept. TE-4
1515 S. Manchester Ave., Anaheim, Calif.
NEW YORK • LOS ANGELES
A subsidiary of Ling-Temco Electronics, Inc.

and Canada.

The heart of Bedford's new electronic and mechanical telephone system is housed in the attractive modern and functional telephone building at 317 South Richard Street. Designed by Lawrie & Green, Architects of Harrisburg, the building was constructed by Robel Construction Co., Inc.

Bell of Pa. and AT&T Ask Authority for New Facilities

THE BELL Telephone Co. of Pennsylvania and the American Telephone & Telegraph Co. in a joint application to the FCC last month asked approval for the construction of 100-pair, 19-gauge cable and N carrier systems between Pennsylvania points, at a cost of $243,500. The cable, in the main, will be buried and will be arranged for carrier use only. It will connect to the existing toll cable network at Corry, Pa., and will complete a cross link between two major north-south routes from Erie and Warren to Pittsburgh.

Also last month, the Southern Bell Telephone & Telegraph Co. asked FCC approval for the installation of BN and R carrier systems between Cross City and Gainesville, Fla., and between Gainesville and Jacksonville, at a total cost of $110,000. The company's application explained that the Air Defense Command has requested full period talk and data circuits from the Air Force base near Cross City to Montgomery, Ala., and other states. It said establishment of the proposed carrier channels is the best way to provide the service.

Bell of Pa. Earnings Rate Increased In '60

THE Bell Telephone Co. of Pennsylvania, which spent $116,363,000 on new construction in 1960, had a record high plant investment at the end of the year of $1,271,717,000, President W. D. Gillen stated in the annual report published last month. Total plant investment increased during the year by $78,650,000.

"The company achieved a nominal increase in earnings as related to the new present value of its plant investment," Gillen said. "The 5.36 per

MOTOROLA PRECISION MEASURING INSTRUMENTS

Rugged...Dependable...Portable

You'll find that these new battery-operated test units will simplify and speed maintenance of your exchange terminal equipment, and serve all of your field requirements as well. Capable of handling carrier, microwave and mobile radio measurements, yet rugged and portable, they are Motorola designed and built for dependable, trouble-free service. They meet today's need for quick, accurate measurements of conventional tube equipment, as well as the most sensitive transistorized electronic circuits.

- ***BATTERY OPERATION*** eliminates hum and noise interference
- ***LIGHT AND COMPACT*** for maximum portability and handling ease
- ***EXTENSIVELY TRANSISTORIZED*** for long life, low maintenance

Units weigh less than 8 lbs., measure 10½" x 6¼" x 5¾" overall.

ELECTRONIC DC MULTIMETER
S 1052A $195.00

TRANSISTORIZED AC VOLTMETER
S 1051B $185.00

TRANSISTORIZED AC VOLTMETER
with 117VAC/Battery Power Supply
S 1053A $225.00

	ELECTRONIC DC MULTIMETER	TRANSISTORIZED AC VOLTMETER
FREQUENCY & RANGE	Ohmmeter—10 to 100,000 ohms (center scale) Ammeter—1 microamp to 300 milliamps (full scale)	20 CPS to 1 Megacycle
FEATURES	High sensitivity—makes virtually all measurements required in transistorized circuitry.	More accurate microvolt and millivolt measurements—eliminates power line noise interference and ground loops.
VOLTAGE RANGE	2 mv. to 1000 volts (0.1 to 1000 volts full scale.) 9 ranges in 1, 3, 10 sequence.	100 uv. to 300 volts RMS (.001 to 300 volts full scale.) 12 ranges in 1, 3, 10 sequence.
ACCURACY	±3% of full scale (volts)	±3% of full scale
INPUT IMPEDANCE	11 megohms	10 megohms shunted by 15 mmf, volt ranges... 1 megohm, by 30 mmf, millivolt ranges
BATTERY LIFE	400 hours	Over 400 hours
	COMPLETE WITH REMOVABLE FRONT COVER	

FOR FULL INFORMATION, WRITE OR CALL TODAY:

MOTOROLA
COMMUNICATIONS & ELECTRONICS, INC.
A Subsidiary of Motorola Inc.
4501 Augusta Blvd., Chicago 51, Ill. • SPaulding 2-6500

BUILT-IN BALANCE

WITH ALPHADUCT REINFORCED DROP WIRE

Balanced breaking strength of the conductors—400 pounds plus, with #18 AWG, 30% copperweld. Adhesion of the insulation—strong enough to prevent slipping at maximum load without physical or electrical failure. Neoprene jacket—tough, abrasion and weather resistant with enough "beef" to prevent buckling at the "P" clamps all the way up to maximum conductor strength. Compression cutting resistance—no break-down in "P" clamps up to overall breaking strength of the conductors. This sturdy balanced construction resists deformation and provides greater protection against lightning failures. This combination of exclusive Alphaduct features assures you of built-in balance for more years of trouble-free service and lower initial installation costs.*

National Distributors: Automatic Electric Sales Corporation, Northlake, Illinois; Leich Sales Corporation, 427 W. Randolph Street, Chicago, Illinois.

ALPHADUCT WIRE AND CABLE CO. NEW BRUNSWICK, N. J.

Regional Distributors: Buckeye Telephone & Supply Co., Columbus Ohio; The Lindsay Telephone Supply Co., Cleveland, Ohio; Pankey Supply Co., Charlottesville Va.

*It's dated for comparison.

cent earnings rate, representing an improvement of 0.23 per cent over 1959, was achieved in spite of increases in wage rates and material costs and is the result of higher operating efficiencies, automation, and vigorous marketing efforts."

Net operating income for 1960 totaled $67,330,000, approximately $5,000,000 more than in 1959. Operating expenses increased by more than $11,000,000 for the year to about $269,000,000. Operating revenues last year were $419,472,000, against $397,876,000 in 1959.

The number of telephones served by the company increased last year to 4,303,000 with 97% dial-operated. The number of localities provided with direct distance dialing increased from 92 to 158, and 37% of all toll calls originating in Pennsylvania are now dialed direct by customers, the report pointed out.

Pacific Tel. Earnings Decline In 1960

THE Pacific Telephone & Telegraph Co. set "many new records for service" last year, but at the same time rising costs resulted in a decline in per share earnings, President Carl O. Lindeman declared in the annual report received by stockholders last month.

The company gained 429,000 telephones to reach an all-time high of 7,924,000; it handled 12 billion calls, including 359,000,000 toll calls; and $380,000,000 was spent in 1960 on new construction and replacements, compared with a 1959 figure of $341,000,000. At the end of the year, the company had 2000 communities linked together by over 40,000,000 miles of wire and 2,000,000 miles of microwave circuits.

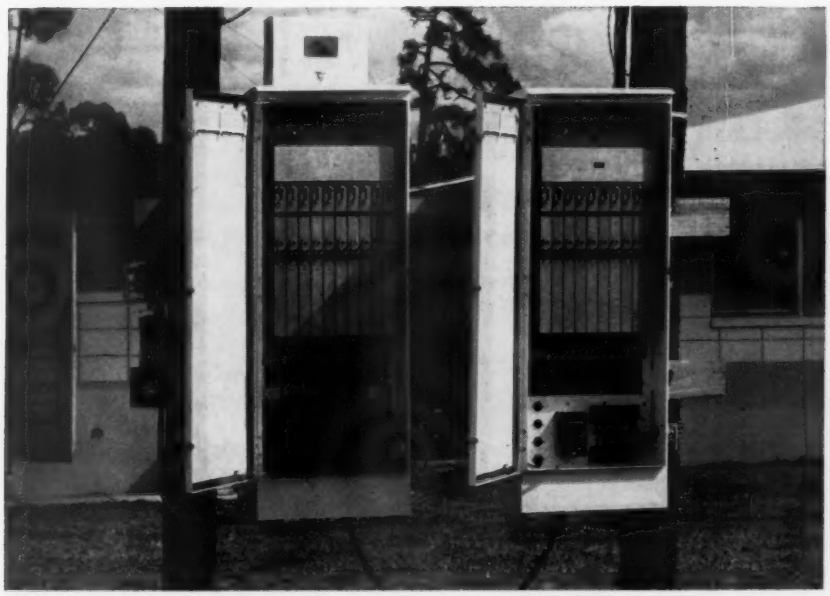
Although operating revenues in 1960 amounted to $1,135,890,000, compared to $1,040,706,000 a year earlier, Lindeman noted that operating expenses also hit a new high of $684,749,000 compared with $626,804,000 in 1959. The company's average plant investment reached a record high of $3,324,149,000 in 1960, compared to $3,067,153,000 the previous year. Net income was $150,773,000 last year, compared with $144,392,-

The PANHANDLE Urban "X"

Cable Subscriber Carrier System

is

- Completely transistorized
- Available with standby power
- Designed for maximum simplicity of lineup and maintenance
- Available with all normal subscriber signaling options (frequency bridged or divided ringing)
- The most advanced cable subscriber system in the carrier field.



★

20 Channel
Pole Mounted
Urban X
Subscriber
Location

★

PANHANDLE ELECTRIC SALES, INC.

Arlington, Texas

"X" Systems Marketed Exclusively By

INTERNATIONAL TELETRONICS, INC.

644 Braniff Airways Building — Dallas 35, Texas

DITCH WITCH TRENCHER

Lowest Cost Service Line Trench for

TELEPHONE COMPANIES

9 HP Model M-3T shown here

● Costs as little as 2c a ft. to trench for underground wiring. Especially designed for the telephone industry, the M-3T package includes dual wheels and trailer. Digs 4" to 8" wide, depths to 4' . . .

OTHER SIZE DITCH WITCH, 7 TO 30 HP, DIG UP TO 16" WIDE & UP TO 6' DEEP

Now Available— New Crawler Trenchers!

9 HP and 12 HP

CHARLES Machine Works, Inc.

697 BIRCH ST. • PERRY, OKLA.
CALL COLLECT: FE 6-4404

CEECO

CEECO TYPE C274

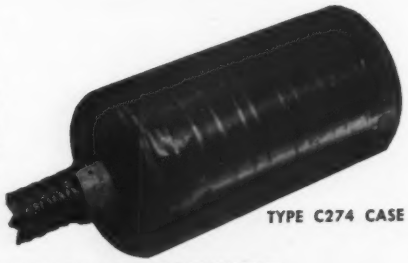
GALVANIZED STEEL CASE ASSEMBLIES

FOR DIRECT EARTH BURIAL INSTALLATION.
CONTAINING FOUR TO FOUR HUNDRED SIXTY COILS.

These assemblies can be equipped with loading coils, capacitors, inductors and MF units. E

CEECO

NOTE: These assemblies are completely covered with plastic tape to protect all metal from electrolysis and other soil corrosive agents.



TYPE C274 CASE

- LEAD STUB ASSEMBLIES ARE PRESSURIZED.
- PLASTIC STUB ASSEMBLIES ARE SEALED IN THERMOPLASTIC COMPOUND TO INSURE PROTECTION FROM MOISTURE.

Write us for assistance on your loading problems.

Ceeco assemblies are sold by your telephone equipment supplier.

COMMUNICATION EQUIPMENT & ENGINEERING CO.

5646 West Race Avenue • Phone EStebrook 8-3109 • Chicago 44, Illinois

000 in 1959, but earnings per common share dropped to $1.43 from $1.47.

It was also announced last month that the Pacific company's Board of Directors has declared a dividend of $1.50 a share on preferred stock, payable April 14 to holders of record on March 31, and a dividend rate of 28½ cents per share on the common stock, payable March 31 to holders of record on March 8.

Northwestern Bell Reports Record Construction In '60

WHILE spending $106,000,000 last year to carry out the largest single-year construction program in its history, Northwestern Bell Telephone Co. had a net gain of 138,439 telephones, to bring the total in service to 2,514,701, President A. F. Jacobson said in his annual report.

Local calls handled by the company in its five-state area climbed to an average of 12,000,000 a day, while long distance calling was 6.5 percent above 1959, with the total number of toll calls reaching 128,690,000.

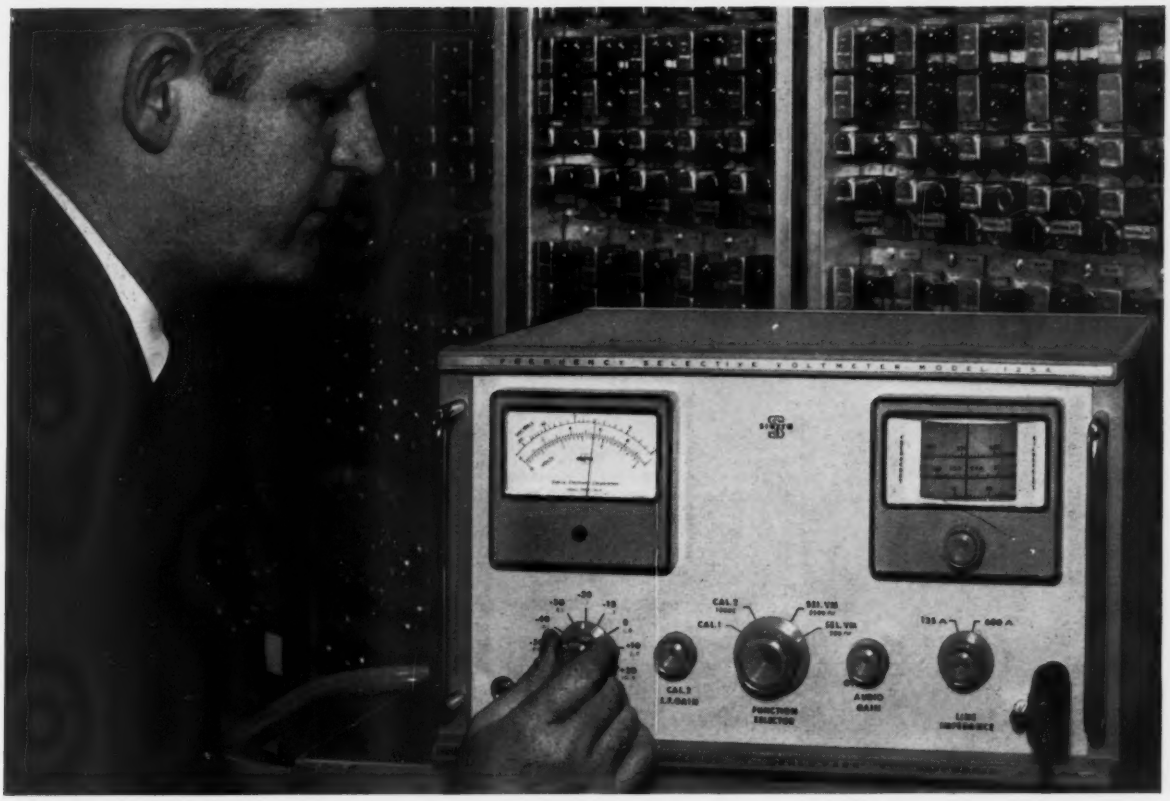
Jacobson pointed out that earnings for 1960 amounted to 5.95 percent related to the present value of plant and equipment, compared with 5.73 percent in 1959. Earnings per share of company stock were $2.11 for 1960 compared with $2.05 for 1959.

Operating revenues totaled $285,637,420 in 1960, compared with $265,485,679 in 1959. Operating expenses were $174,365,855 last year and $162,368,286 the year before. Taxes totaled $63,891,290 in 1960 and $60,213,603 a year earlier. Last year's net income of $42,273,267 compared with $39,005,220 in 1959.

Home Telephone To Spend $700,000

HOME Telephone & Telegraph Co. of Virginia plans to spend about $700,000 in 1961 for improvement and expansion of telephone service in southeastern Virginia, according to H. Dail Holderness, president of that company.

"This compares with $580,000 spent for construction of telephone facilities during the past year," Holderness said. "In order to keep abreast of the industrial and resi-



Why is the Sierra Frequency Selective Voltmeter the standard of the communications industry?

Performance-proved by thousands of users! • Accepted by all major carrier systems manufacturers, specified by most! • Uniquely convenient, versatile, dependable for monitoring carrier modulation level!

- Single frequency band, one continuous tuning range—eliminates band switching
- Flat voltmeter section—for accurate measurement, easy detection of spurious signals
- Wide bandwidth—1 to 620 kc—covers 120 channels per L carrier allocation
- Coarse, fine tuning on a single knob—for greater convenience
- Crystal controlled calibration oscillator—for checking both frequency and level
- Domestically produced—for years-ahead engineering, rugged construction
- Dual selectivity—versatility for communications test, wave analysis, general lab use

SPECIFICATIONS
MODEL 125A

Frequency Range
Tunable Mode: 3 kc to 620 kc
Flat Mode: 1 kc to 620 kc

Measurement Range
Tunable Mode: —90 dbm to +32 dbm
Flat Mode: —30 dbm to +32 dbm

Selectivity
Narrow: Down 3 db 125 cps off resonance; down 45 db 500 cps off resonance
Wide: Down 3 db 1.25 kc off resonance; down 45 db 5 kc off resonance

Price $895.00, f.o.b. factory

Call your Sierra representative or write direct. Sierra Model 125B-CR, with upper and lower sideband carrier re-insertion, and Model 125B-Y, with patchcord connections for type "O" and type "N" Western Electric carrier, also available at additional cost.

Data subject to change without notice.

sierra

SIERRA ELECTRONIC CORPORATION
A Division of Philco Corporation
7127Y BOHANNON DRIVE • DAvenport 6-2060 • Area Code 415 • MENLO PARK, CALIF., U.S.A.
Sales representatives in all principal areas.
Canada: Atlas Instrument Corporation, Ltd., Montreal, Ottawa, Toronto, Vancouver.
Export: Frazar & Hansen, Ltd., San Francisco.

7127

DIAMOND

wing ding

For
HOLLOW WALL
FASTENING

Guarantees Secure Installations of Wall Telephones, Etc.

PLUS

A COMPLETE LINE OF FASTENERS

DHD Hammer Drive Anchors
MULTI-SIZE Wood Screw Anchors
KEYSTONE Shields
DIAMOND Plastic Screw Anchors
SPRING Toggle Bolts
RED SEAL Calking Anchors, Etc.

DIAMOND POLE LINE HARDWARE

• Drive Rings • Bridle Rings • Cable Lashing Clamps • Span Clamps • Angle Screw Fixtures • Aerial Cable Supports • Braid Strippers • Tie Splints • Insulated Screw Eyes • Cable Clamps • Strand Connectors • Toggle Bridle Rings • Duct Rods • Many Other Specialty Items

Send For
FREE SAMPLES
of the Diamond Wing-Ding
Plus Catalog

DIAMOND

DIAMOND EXPANSION BOLT CO., INC.
515 North Avenue, Garwood, N. J.
Please send FREE Samples and Catalog.
Name _____
Company _____
Position _____
Address _____
City _____ State _____
Fasteners With Extra Value

Stromberg-Carlson instructors flank class of United Telephone Co. of Pa. students at special Chambersburg Toll Ticketing school. Standing (l. to r.): A. R. ASCHETTINO, instructor-in-charge; ROBERT A. EPLEY, Hanover; GUY B. MULLEN JR., Harrisburg; CLAY E. LEYDIG, Bedford; R. R. BANKES, instructor. Seated (l. to r.): PAUL E. HEFFNER, Waynesboro; WALTER E. MINOR, Chambersburg; EUGENE B. JOHNSON, Gettysburg. The 6-week course was presented by instructors from the Stromberg-Carlson XY Dial Training School in Rochester, N. Y. Normally, the XY Toll Ticketing course, like regular XY Dial classes, is held at Rochester, N. Y. However, when a concentration of XY Toll Ticketing offices exists in a specified area, the class is occasionally shifted to that area. Certificates of achievement were awarded to the six graduates at the completion of the course.

dential growth which we expect during the coming year it is necessary that we spare no effort in enlarging our facilities and offering new and better means of communications to the citizens of our area. A major portion of this expenditure will be in connection with further additions to central office equipment, telephone station equipment and exchange lines."

"During 1960," Holderness stated, "our plant investment reached $6,600,000.

At the year end, Home Telephone served 15,500 telephones — a gain of 1,500 over 1959. About two-thirds of these were classified as rural. The 1960 increase in telephones established a new record for a one-year period. "This gain is indicative of the continuing demand for telephone service," Holderness pointed out.

Also during the year the company

Fifteen commercial managers of Central Telephone Co. operating companies were recent guests of Automatic Electric Co., Northlake, Ill. From left (back row) are HARVEY J. HASKEL, La Crosse, Wis.; MORRIS DAY Tallahassee, Fla.; LOUIS RUNKLE, Hickory, N. C.; E. W. ROHLCK, Ft. Dodge, Iowa; HENRY L. BURTON, Charlottesville, Va.; RAY JONES, Lincoln, Neb.; CARL PRELLWITZ, Fairmont, Minn.; F. M. MOODY, Charlottesville, Va.; E. D. WILKINSON, Tallahassee, Fla.; C. P. LAMM, Charlottesville, Va. (Front row) ROY HEPLER, Hickory, N. C.; RICHARD LaPAN, Park Ridge, Ill.; RICHARD PERLEY, Des Plaines, Ill.; E. L. DECKER, Lincoln, Neb.; and L. C. BRUNER, Ft. Dodge, Iowa.

ANOTHER FIRST FROM HOLAN...

So New We Haven't Dressed it Yet

It's ready now — the first center-mounted derrick for the utility field that can be operated from a rotating crow's-nest. All that's left to be done is to sheathe in a famous Holan-built body.

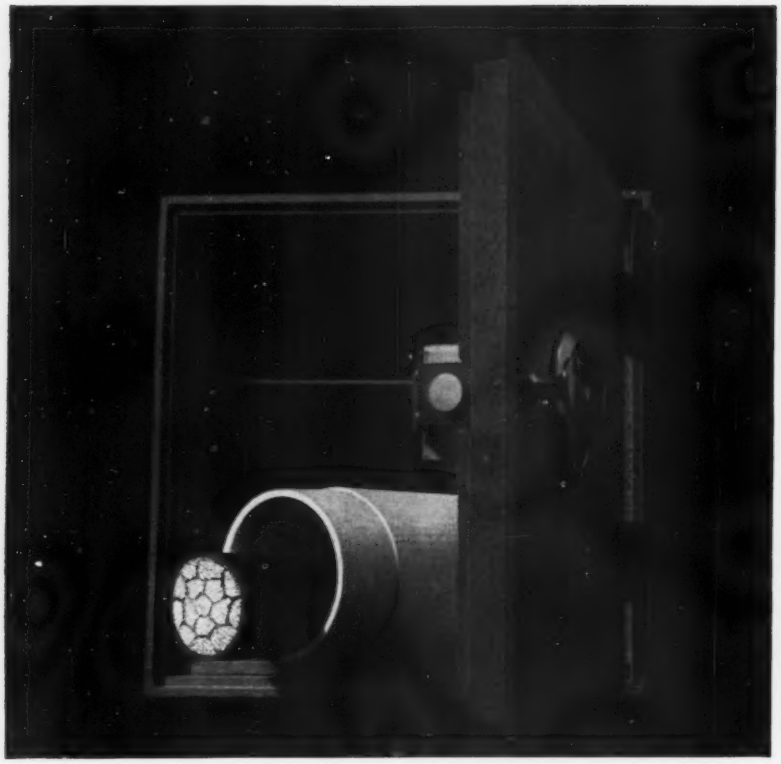
But it has already been subjected to hour after hour of torturous digging and lifting in every position. And it can take it . . . take even the punishment of harnessing the 8,400 pounds of torque of the Holan 5400 Earth Borer.

The center-mounted 7700 erases the blind spots, permits the operator to dig and "live boom" 9,000 pounds . . . rotate 360° in either direction . . . extend and retract the 7-foot boom . . . set 80-foot poles. And he does it all with foot and hand controls . . . and with a safe, unobstructed view of his work area.

The derrick — including the base, superstructure and hydraulic outriggers — is built as an integral unit and can be easily mounted on the chassis at any point behind the cab.

Make it a promise to see this powerful and remarkably versatile derrick with its full range of optional equipment before you buy any center-mounted derrick. Call your Holan Field Representative . . . or write us today . . . for complete information.

HOLAN CORPORATION, 4100 W. 150th St., Cleveland 35, Ohio

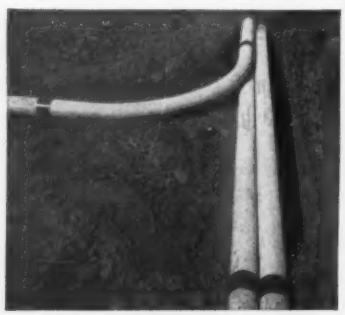


Safeguard cables permanently at the lowest cost with J-M Transite Ducts!

Transite® Ducts, made of tough, durable asbestos-cement, provide rust-free, corrosion-resistant protection for the life of your telephone cables. And, they can be installed, operated and maintained at the lowest possible cost!

Available in 10-foot lengths, light-weight Transite saves installation time and requires smaller installation crews. Because these ducts can be laid in direct contact with each other, no between-tier backfilling is necessary. This means shallower, narrower trenches and lower excavation costs. Transite's easy-to-install plastic coupling is a real money-saver, too! With a flexibility of 5 degrees, it permits simplified splaying without special fittings. Installation savings of up to 15¢ per foot have been made!

Transite ducts require little, if any, maintenance. The permanently tight joint keeps out water-borne silt and dirt. What's more, it permits pneumatic rodding which can save you 5¢ a foot. No wonder one out of every four feet of telephone duct installed in 1959 was Transite. For further information write Johns-Manville, Box 14 TE-4, New York 16, N. Y. In Canada: Port Credit, Ontario.



JOHNS-MANVILLE

JM PRODUCTS

handled more than 1,383,000 long distance conversations to surpass 1959 by about 8.2 per cent. The president noted that this could be taken as a further indication of the value of telephone service to the people of the section.

The company employed 148 men and women at the end of the year and had an annual payroll of more than $500,000 in 1960.

New England Tel. & Tel. Reports Improved Earnings

IMPROVEMENT in the 1960 earnings of the New England Telephone & Telegraph Co. resulted primarily from growth of the business and greater operating efficiency, President Erskine N. White declared in the annual report to stockholders.

The company gained 141,000 telephones and there was a 5 per cent increase in toll calls during the year, the report pointed out. At the end of the year, stations in service totaled 3,334,000.

Total revenues were $25,000,000 over 1959, without any increase in customers' rates, and at the same time operating expenses, excluding taxes, increased $13,000,000, White noted.

The New England company spent $115,000,000 on its construction program during 1960 to bring the total for the past five years to more than a half-billion dollars, and it expects to invest another half-billion in the next five years.

The 1960 net income of $52,000,000 was $3,500,000 higher than for 1959, and last year's per-share earnings of $2.37 were nine cents more than for the previous year. Revenues and other income last year totaled $405,646,000, compared with $380,673,000, while expenses and taxes were $339,635,000 in 1960, and $320,908,000 a year earlier.

'Soft Spots' In Economy Shown In Mt. States Report

MOUNTAIN States Telephone & Telegraph Co. "had a good year in 1960, but there were definite soft spots in the economy," President Walter Koch stated in his annual report. He pointed out that "Results did not match those of 1959 in number of

LOW-COST, LONG-LIFE PROTECTION

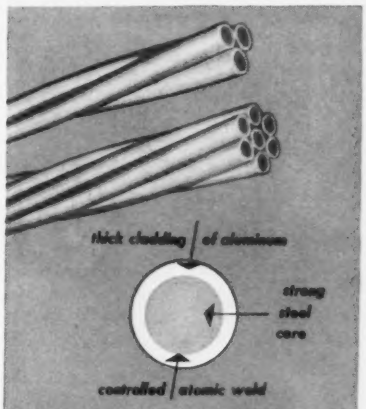
for your overhead lines

Alumoweld Guy and Messenger Strand is designed to last as long as the pole it guys or the cable it supports. Each wire of this low-cost strand has a *thick* aluminum covering applied to the strong steel core by the controlled atomic-welding process. This unique method of manufacture gives Alumoweld the same permanent protection against corrosion as solid aluminum wire.

The rugged strength of Alumoweld is the same as steel, yet Alumoweld weighs 18% less and lasts far longer. It's easy to handle, easy to install.

Supplies of Alumoweld Strand are available for prompt shipment from our warehouses in New York, Chicago, Pittsburgh and Memphis.

For the complete story on Alumoweld, write for Engineering Bulletin E.D. 3000.



Alumoweld's *thick* aluminum covering—25% by area—will not crack, flake or peel. It is inseparably interlocked with the high-strength steel core by a ductile weld that remains permanent under all operating conditions.

COPPERWELD STEEL COMPANY

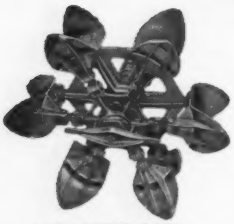
WIRE AND CABLE DIVISION Glassport, Pa.

For Export: COPPERWELD STEEL INTERNATIONAL COMPANY, New York

Canadian Distributor: NORTHERN ELECTRIC COMPANY LIMITED

GENERAL MACHINE PRODUCTS COMPANY, INC.

Old Lincoln Highway at Pa. Turnpike, Trevose, Pa.



C-R POWER REEL

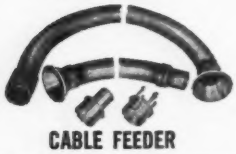
GMPCo

AERIAL TENTS
CABLE BENDERS
CABLE BLOCKS
CABLE LASHERS
COAXIAL CABLE TOOLS
LASHING WIRE
CLAMPS AND GRIPS
PORTABLE & POWER REELS

PRESSURE TESTING KIT

SLACK PULLER

COMPOUND



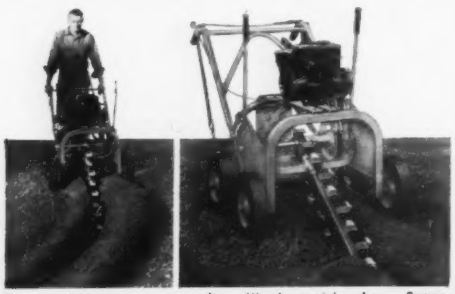
CABLE FEEDER

B, C, D, E, & G CABLE LASHERS

Special Purpose Tools To Specifications — Catalog on Request

Over 600 various items of Line Construction Tools, Maintenance & Pressure-Testing Equipment in stock for immediate shipment

TELEPHONE COMPANIES USE POW-R-SPADE to lay cable and conduit. Savings and extra profits on every job. Have your own machine. No waiting. No delays.



Digs straight, curves, or angles without special set-up. Comes completely assembled. One man operation from start to finish.

POW-R-SPADE
PORTABLE TRENCHER

"A labor saver, easy to operate, and profitable"

Fast trenching at lowest cost. Reduces man-hours to minutes. Eliminates disadvantages of subcontracting. A profitable, inexpensive machine to own and operate.

- Digs 3 in. wide by 1 to 24 in. deep; or 4 in. wide by 18 in. deep
- Light weight, compact, portable
- Since 1956 satisfied users all over U. S. A.
- Dependable trouble-free trenching at lowest cost.
- Digs 1½ to 17 ft. per minute, depending on soil conditions

FOR FREE BOOK ON POW-R-SPADE AND PRICES CALL COLLECT 788-9527

MAIL DIRECT

STAMPINGS, INC.
Dept. R, Rock Island, Illinois

OR TEAR OUT THIS AD — ATTACH TO LETTERHEAD AND

main telephones gained, and the gain in extension telephones was less than in the record-breaking year of 1959. The increase of 9 percent in long distance messages compared to 12 percent the year before.

"Optimistic rate of growth expectations for 1960 by some forecasters did not materialize, but basically we have confidence in the growth prospects of this area," Koch continued. "Our construction program of $146,000,000 marked the fifth consecutive year that such programs have exceeded $100,000,000."

The report noted that while population in the area served by the company rose 36% since 1960, the number of telephones increased to a total of 2,410,000 at the end of 1960. At the end of last year, 96 percent of all telephones were dial.

Operating revenues totaled $317,252,021 in 1960, compared with $287,525,773 a year earlier; operating expenses were $189,456,364 last year, and $174,943,618 in 1959; and net income was $46,065,244 in 1960 and $41,899,358 in 1959.

Southern New England Reports Progress In '60

SOUTHERN New England Telephone Co. reported last month that

DOUGLAS K. BOGART has been appointed sales promotion manager of Preformed Line Products Company it has been announced. For the past ten years, Bogart has been engaged in the creative and administrative phases of advertising, merchandising and sales promotion for leading Cleveland companies.

NS Special 080-25 COPPERPLY® makes 1900 ft. span

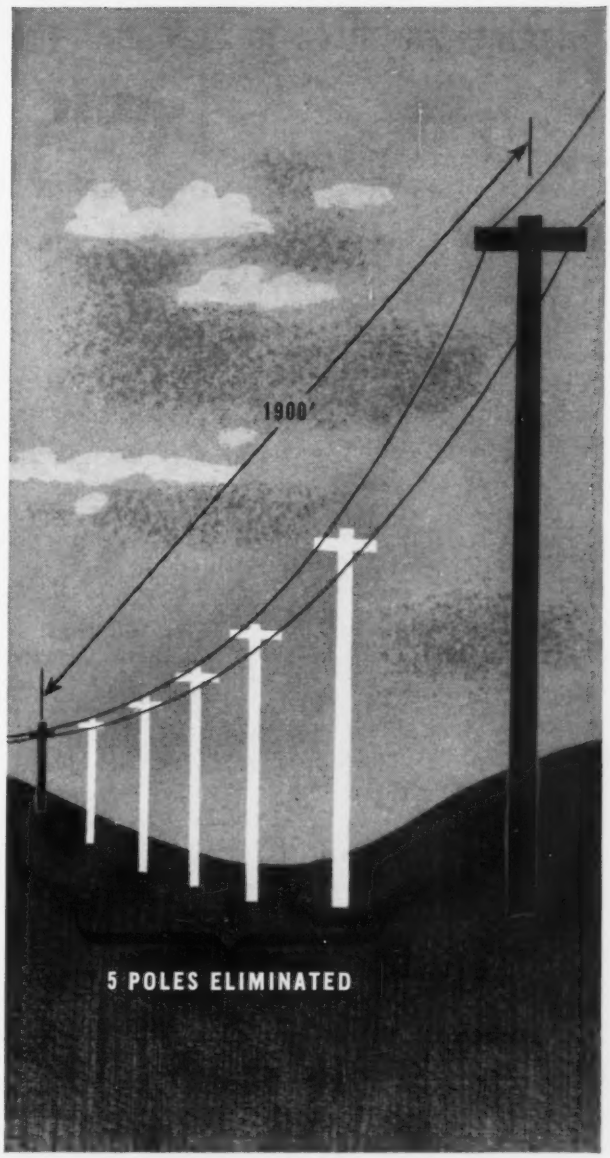
Now you can span distances up to 1900 ft., depending on terrain, with special-strength National-Standard COPPERPLY wire (copper plated steel conductor). You eliminate as many as five poles per span with this new concept in long-span aerial insulated wire plant.

MAINTENANCE SAGGING and damage resulting from ice loading is virtually eliminated, since COPPERPLY does not exceed 55% of its breaking strength when loaded and resting on the ground. And COPPERPLY will meet NESC ground clearance requirements when unloaded.

UNINTERRUPTED SERVICE—under severe testing conditions, Special 080-25 COPPERPLY (25% conductivity, 4 mils of copper coating) was buried in three feet of snow for over three months without any interruption in line service. In addition, long-span installation with insulated COPPERPLY cuts installation costs, prevents the problem of mid-span hits, eliminates leaks to ground and reduces corrosion. Tree trimming and maintenance costs are appreciably reduced.

To get the complete story on Special 080-25 COPPERPLY and other standard sizes, contact National-Standard Company, Niles, Michigan.

C-61-1



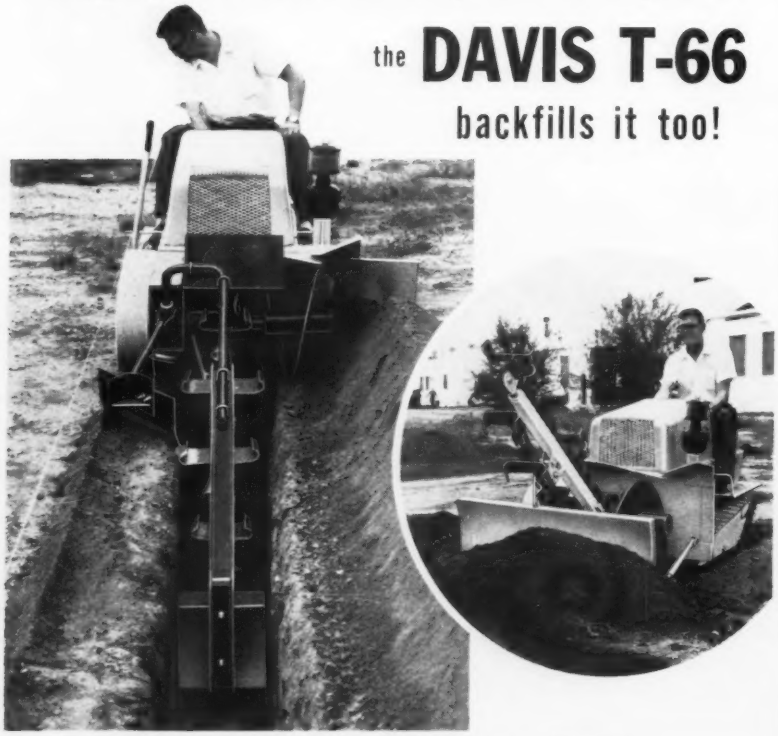
Special 080-25 COPPERPLY is designed to rest on the ground at 55% of breaking strength, allows great savings in pole installation.

NS NATIONAL-STANDARD COMPANY

NATIONAL-STANDARD COMPANY
Niles, Michigan

Digging the ditch is only half the job...

the DAVIS T-66 backfills it too!



Coast to Coast... Border to Border... and in many foreign countries Owners Acclaim the T-66!

When you've dug a trench you're only half done; you have to backfill it, too! Only the Davis T-66 does the whole job, and does it with profit-making performance — because it is **designed** as a trencher and a backfiller. Just ask any user. Large track shoes, a unique hydraulic drive, and the T-66's extra-heavy 1400-lb. weight give ground-gripping traction for accurate ditching control and backfilling power. No erratic rubber-tire bounce. Hydraulic boom lets you have absolute control over digging depth as well as backfill blade. Instant Forward Reverse provides unmatched maneuverability for backfilling. It digs 4″ wide to **66″ deep**, or **12″ wide**, 30″ deep, and at varying widths and depths in between. Attachments available for trenches **16″ wide**, 24″ deep and **flush** alongside walls or fences. You can buy with confidence because the T-66 is built to withstand the severest tests, and is produced by men who are leaders in the design of digging equipment.

the DAVIS HUSTLER UTILITY TRAILER

This 2000-lb. capacity, tilt-bed trailer for the T-66 and other loads has low center-of-gravity stability and load equalization suspension system. Sides optional.

the DAVIS PUP TRENCHER
Self-Propelled

Digs by itself. This self-propelled trencher is driven by a six-speed winch mechanism. A productive tool for trenches 2″-3″ wide to 36″ deep, or 4″ wide, 18″ deep.

We Welcome Competitive Demonstrations!

The performance of the T-66 creates confidence that invites comparison so you know why it is the standard bearer of trencher value. Ask about its 90-day unconditional guarantee!

DAVIS MFG. INC.
1514 S. McLean Blvd., Wichita 13, Kan.

Please send me description T-66 literature and the name of my DAVIS dealer____. I am also interested in the Davis Pup____ Davis Hustler____.

NAME_____

ADDRESS_____

TOWN_____ STATE_____

D2-261

telephone business volume last year topped 1959 despite slower growth late in the year. In his annual report to stockholders, President Lucius S. Rowe noted increases in total revenues, telephones gained, out-of-town calls, and directory advertising sold.

"Net profits available for dividends also improved in 1960," he said, "amounting to $20,000,000, an increase of $1,000,000 over 1959."

The gain in telephones was 58,000 in 1960, or about 10,000 above the average of the previous 10 years.

Total income for the company in 1960 was $136,000,000, compared with $128,000,000 in 1959. Expenses were $116,000,000 last year, against $109,000,000 in 1959.

Dr. L. A. Carapella Joins General Dynamics Electronics

DR. LOUIS A. CARAPELLA has joined the Research Division of General Dynamics Electronics with responsibility for technical liaison within the division and with other divi-

DR. L. A. CARAPELLA

sions of General Dynamics Corp., it has been announced by Dr. Nisson A. Finkelstein, vice president and director of research.

Dr. Carapella joins General Dynamics from the Sylvania-Corning Nuclear Corp., Bayside, N. Y. Earlier he had served as technical director for the Jessop Steel Co., manager of nuclear fuel manufacturing for the Atomic Power Division of Westinghouse Electric Corp., and director of

INTEGRATED MESSENGER

"ALL-WEATHER" CORE

TWISTED CONDUCTORS

You get all 3 in SUPERIOR'S

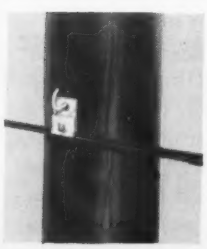
I.M. 119 RDW

One Pair Distribution Wire

All three construction features add up to make SUPERIOR IM 119 RDW just about a "perfect pair" for extension of lateral runs from open wire, rural distribution cables or aerial plant.

Count these advantages in dollars saved when you install SUPERIOR one-pair distribution wire:

1. **Ready-access galvanized steel support wire for easy and positive attachment.**
2. **Strength of messenger available as required for existing span length.**
3. **Integrated messenger permits positive support and prevents damage to conductors at tangents and deadends.**
4. **High-density, black polyethylene, with exclusive inlaid* color-coding stripe, insulates the conductors and provides all-weather protection and transmission stability.**
5. **Conductors twisted within the core to eliminate transpositions for low noise susceptibility.**
6. **Black polyethylene jacket extruded over both conductor pair and support wire.**



Superior's
NEW
Tangent
Support
TS-934

Order SUPERIOR IM 119 RDW now for economy and ease of installation, better physical characteristics and increased electrical capabilities.

**Patent applied for*

Write for detailed information and prices to

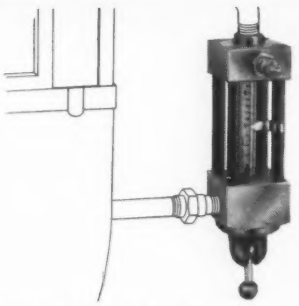
SUPERIOR CABLE

Superior Cable Corporation • Hickory, North Carolina

5491

G. W. DAHL • G. W. DAHL • G. W. DAHL • G. W. DAHL • G. W. DAHL

INSTANTLY INDICATES GAS FLOW RATE TO INDIVIDUAL CABLES!



Dahl Air Rate Indicators monitor condition of large diameter (low pneumatic resistance) portion of pressurized cable within a mile or two of dry air source.

Developed in collaboration with Bell Telephone Laboratories, Inc., this indicator (coarse calibration) promptly responds to relatively large leaks near office, and progressively less as distance increases.

Through-port in lower block permits assembly of indicators in groups without separate manifold . . . integral shutoff valve with toggle handle disconnects a particular cable from gas source if necessary. All connections are anodized 24 S-T aluminum.

REQUEST Catalog T-1 for complete data on this indicator and other Dahl pressure system valves for indicating and regulating air usage in continuous flow systems. G. W. Dahl Co., Inc., 80 Tupelo St., Bristol, R. I.

G. W. DAHL CO., INC.

SPECIALISTS IN COMPACT VALVES AND CONTROLS

G. W. DAHL • G. W. DAHL • G. W. DAHL • G. W. DAHL • G. W. DAHL

G. W. DAHL • G. W. DAHL • G. W. DAHL • G. W. DAHL • G. W. DAHL • G. W. DAHL • G. W. DAHL • G. W. DAHL • G. W. DAHL • G. W. DAHL

Vermeer 4-T POW-R-DITCHER

Rugged, Low Cost Ditcher Digs 6"-14" Wide, 4½' Deep

This highly maneuverable 4T POW-R-DITCHER is only 46" wide . . . fast . . . and can handle most ditching jobs at a fraction of the cost of larger, more expensive units. The finest ditcher buy for low cost investment, low maintenance and high production.

IDEAL FOR LAYING GAS, WATER AND CABLE LINES AND FOR DIGGING HOME FOUNDATION FOOTINGS

PICK THE POW-R-DITCHER TO FIT YOUR NEEDS

524T

W-3

W-1

3P

Please send me FREE information and prices on the complete Vermeer line of self-propelled POW-R-DITCHERS.

NAME.....

FIRM.....

ADDRESS.....

CITY..... STATE.....

☐ Also include information on new Vermeer hydraulic back filler.

VERMEER MANUFACTURING COMPANY

1480 WASHINGTON • PELLA, IOWA

metal container research for the Continental Can Co. During World War II he was head of the metallography department of the Naval Research Laboratory.

Dr. Carapella was born in Tuckahoe, N. Y. He received a bachelor's degree cum laude in mechanical engineering from Michigan State University, and master's and doctor's degrees in metallurgy from Harvard University. He was elected to Sigma Xi and Tau Beta Pi, honorary socities, and holds memberships in the American Institute of Mining, American Society for Metals, and the American Institute of Management.

Leader Named Sales V. P., Sequoia Wire & Cable Co.

ALBERT H. LEADER has been named vice president-sales of the Sequoia Wire & Cable Co., Redwood City, Calif., a wholly-owned subsidiary of the Anaconda Wire & Cable Co. Leader has been Los Angeles district manager for Anaconda since June 1 of 1960. In his new position, he will assume overall responsibility for the Sequoia national sales program.

Leader joined Anaconda Wire & Cable Co. as a salesman in the Seattle district office in 1948. He became manager in Seattle in 1954.

Highway Trailer Names Biggs To New Post

SEWARD E. BIGGS has been named vice president in charge of manufacturing, a new post, for Highway Trailer Industries, C. L. Schneider, president, has announced.

Biggs, formerly manager of the Truck & Cab Div., White Motor Co., Cleveland, will be responsible for manufacturing operations in Highway's plants in Edgerton and Stoughton, Wis.; Hazleton, Pa.; Newark, N. J.; and Los Angeles, Calif. His headquarters will be in New York.

Before joining White, Biggs was vice president of operations for Youngstown Steel Car Corp., Youngstown, Ohio. His previous associations include Trailmobile, Inc., where he was made vice president and general manager of manufacturing, and ex-

WHAT IS A "NETWORK"?

Telephone engineers the world over agree that only common control switching can adequately serve automatic dial networks. Webster defines a network as "any system of lines or channels interlacing or crossing".

How does this apply to telecommunications?

Historically, our networks have been based on the old "urban center-rural area" philosophy. Dial systems were in use in communities that could be served by single switchboards long before they were used in metropolitan areas. When they were finally cut over in these "urban" centers, they were, necessarily, "networks" for it required a group of switchboards or "offices" to serve densely populated areas.

Since these early days, there has been a distinct dynamic shift in our national population.

First, it has grown, and is growing today at an accelerated pace.

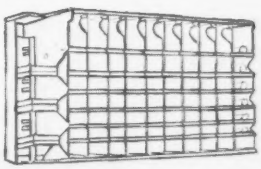
Second, population growth has dictated population shifts. Population growth has been much greater in "suburbia" and "inter-urbia".

These areas, on the very fringes of metropolitan areas, have been, by geographical necessity, drawn into the network operation that characterized the urban center.

Finally, the nationwide DDD network concept makes it virtually impossible for any company, however small or remote today, to forsee any appreciable time lapse before it becomes an integral part of this nationwide network.

Cutover to any switching system that is not common control crossbar is, at best, only a compromise with the future.

North common control crossbar switching systems put you "in step" with progress today, keep you "in step" with progress tomorrow.



THE DYNAMIC FORCE IN THE TELEPHONE INDUSTRY

NORTH ELECTRIC COMPANY

GALION, OHIO

NORTH

No. 2 in a series of factual presentations on North Crossbar

Here's the NEW CALCULAGRAPH "POSITIVE GUIDE" Tab Ticket Plate*

Assures Still Greater Toll-Timing Accuracy

This is the newly developed "positive guide" tab ticket plate that provides positive protection against misalignment of tab-size toll tickets without any loss of speed. Now you can completely eliminate inaccuracies due to improper registration of the toll time. What's more, this new ticket plate is interchangeable with existing plates. This means the change can be made in the field without disrupting operations on your switchboard. And it only takes a minute or two to do — it's that easy.

This new development adds to the long list of Calculagraph engineering accomplishments that have solved telephone industry toll-timing problems for more than six decades. Plan now to add this new feature to your Calculagraphs.

**Also available for Calculagraph "round" models.*

CALCULAGRAPH Company

276A Ridgedale Avenue, East Hanover, New Jersey

The appointment of SIDNEY W. GABRIEL as director of purchases has been announced by J. R. MacDonald, president and chairman of the board, General Cable Corp., New York City. Gabriel was assistant director of purchases, and has been with the corporation for 35 years.

ecutive and engineering positions with the Fruehauf Trailer Co. and the Chevrolet Division of General Motors.

A former vice president and director of the Truck-Trailer Manufacturers' Association, Biggs is active in industry affairs and served as a member of the advisory committee on truck-trailer manufacturing in the National Production Authority.

General Dynamics Names Howden To New Post

NORMAN M. HOWDEN has been appointed to the newly created post of Rochester News Bureau Manager of General Dynamics | Electronics, according to W. H. Herrman, acting director of public relations.

Howden joined Stromberg-Carlson's public relations department as staff assistant in 1955. He had previously served as director of publicity for the Rumrill Co., and prior to that was science editor for the Rochester *Democrat* and *Chronicle*. While in that post, he received the A.A.A.S.-Westinghouse Award for the best science news story in a U. S. daily newspaper in 1950.

A graduate of the University of Rochester in 1930, he earned a mas-

ter's degree in English from the same institution in 1932.

Superior Cable Names Wardell, Advtg Mgr.

SUPERIOR Cable Corp., Hickory, N. C., has appointed John J. Wardell as advertising manager. He joins Superior Cable after serving as advertising manager of Surprenant Mfg. Co., Clinton, Mass.

As an account executive, he was previously associated with Baratta Advertising Agency, Worcester,

JOHN J. WARDELL

Mass., and Paul H. Johnson Co., advertising agency, Providence, R. I. During World War II he was an officer in the United States 8th Air Force and completed 25 missions over Europe.

In his new position he will work under the direction of James H. Bowman, vice-president in charge of sales, to co-ordinate advertising and sales promotion plans involved in Superior Cable Corporation's current expansion.

Stromberg-Carlson Credit Corp. Announces Changes In Officials

AT ITS recent annual meeting, the directors of Stromberg-Carlson Credit Corp. (a subsidiary of General Dynamics Corp.) reelected James D. McLean as chairman and Charles W. Pritchard as president. Also reelected was Carter W. Eltzroth, secretary.

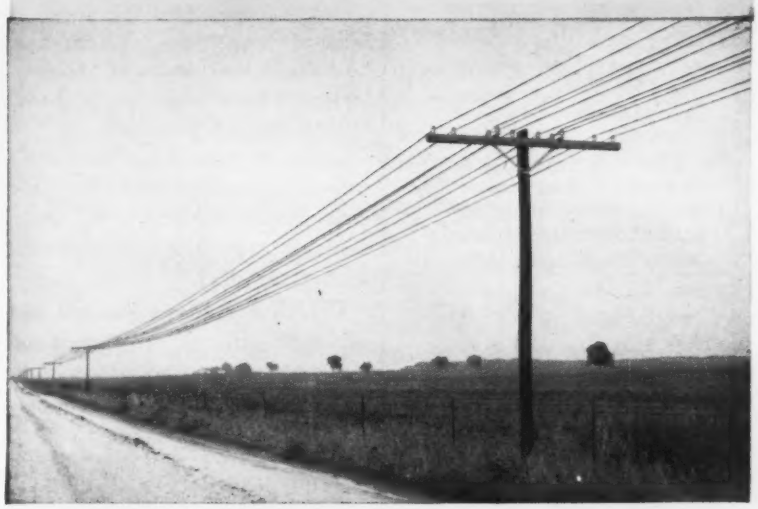
Crapo HTL-135

High Tensile Line Wire

MADE TO WITHSTAND HEAVY STORM LOADS

Time and time again, *Crapo* HTL-135 has demonstrated its ability to stand up under heavy ice and wind loads when other conductors failed. This can be attributed to the fact that *Crapo* HTL-135 combines high strength with high fatigue endurance plus superior elastic qualities which enable it to spring back into place when loads are removed. The result: service interruptions are minimized, re-sagging is seldom necessary, where this rugged telephone wire is used.

The excellent telephonic transmission characteristics of *Crapo* HTL-135 make practical subscriber loops of 14 to 15 miles with normal voltages and equipment. Longer loops are possible where higher voltages and more sensitive telephone sets are employed. For dependable, long-span, low cost rural lines, specify *Crapo* HTL-135.



HERE'S PROOF OF DEPENDABILITY

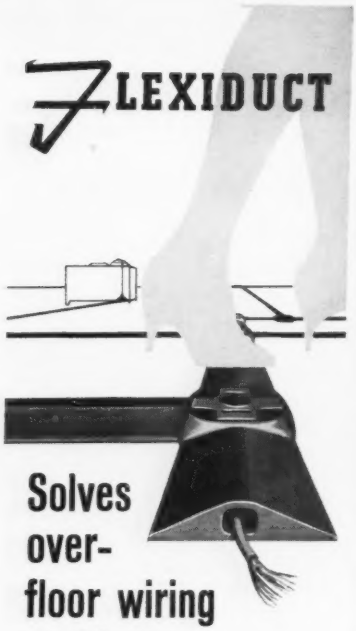
The **Crapo** HTL-135 in this typical rural line of 300-foot spans was subjected to two heavy ice storms within 14 months. This photo shows the line, without resagging, three months after the second storm.

Write for Manual TM-59 containing complete engineering data!

Crapo HTL-135

INDIANA STEEL & WIRE CO., INC.
Muncie, Indiana

FLEXIDUCT



Solves over-floor wiring problems

- ECONOMICAL • EFFECTIVE
- FLEXIBLE • SAFE
- EASY, NOISELESS INSTALLATION

Only two parts handle all over-the-floor duct work—duct and universal fitting. Duct available in 3 sizes:
No. 1 Chase ¼" x ½";
No. 2 Chase ½" x ¾";
No. 3 Chase ¾" x 1";
Other tees, ells and risers also available.

UNIVERSAL FITTING
Part No. 345
(Patent Pending)

Always Keep Flexiduct on Hand Available through:
Buckeye Telephone & Supply Co.
Graybar Electric Co., Inc.
Kellogg Switchboard & Equipment Co.
Leich Sales Corp.
Stromberg-Carlson
Western Electric Co., Inc.
Winders & Geist, Inc.

Write for descriptive leaflet.

WINDERS & GEIST, INC.
2219 North Cotner Blvd.
Lincoln, Nebraska

LAWRENCE J. CLEARY

ROBERT G. SLAYTON

Robison Clark was elected vice president and controller.

Lawrence J. Cleary and Robert G. Slayton were elected vice presidents, replacing Phillip J. Lucier and G. Warren Schomaker who have resigned to become president and vice president, respectively, of Telephone Communications Corp., a new holding company specializing in the Independent telephone business.

Ernest W. Stanton and Marvin K. Gage were named assistant vice presidents. Robert M. Meyers was made treasurer, and Paul A. Altpeter, assistant treasurer.

McLean is president, General Dynamics | Electronics, a division of General Dynamics Corp. Pritchard is finance manager, Telecommunication Division of General Dynamics | Electronics; Clark is controller of General Dynamics | Electronics. Cleary, Slayton, Meyers, Stanton, and Gage are all loan officers of Stromberg-Carlson Credit Corp.

The Stromberg-Carlson Credit Corp. was organized 10 years ago, pioneering a new concept of financial assistance to Independent Telephone Companies. Over the last decade more than 600 loans have been made to operating telephone companies. In many instances these companies — once considered too large to obtain local financing, and too small to be considered by the larger lending agencies — have used the funds of the Credit Corp. to move up to a position of leadership in the Independent industry.

ERNEST W. STANTON

MARVIN K. GAGE

TELEPHONE MARKET PLACE

HELP WANTED

CABLE SPLICERS, Station Installers, Equipment Installers, Linemen. Experienced men needed. Steady work, good pay. Henkels & McCoy, 1800 Johnson Street, Elkhart, Indiana, or 6100 N. 20th St., Philadelphia, Pa.

AMBITIOUS MEN — Qualified as station installers, equipment installers, cable splicers, linemen. Work in midwest. Harris McBurney Co., Inc., P. O. Box 267, Jackson, Michigan.

TELEPHONE OUTSIDE PLANT ENGINEERS

Immediate Openings For:
Thoroughly Experienced Engineers In Various Project Support Activities In Home Office Staff Group

•

TELEPHONE INSIDE PLANT ENGINEERS
Carrier experience combined with thorough knowledge of transmission criteria. Must be willing to relocate after initial home office assignment.

•

CARRIER INSTALLERS SUPERVISORY
Heavy experience requirement for supervision of projects at various missile bases.

LIBERAL EMPLOYEE BENEFITS
Including excellent retirement program. These positions offer unusual opportunities in a new division of a long established company. Send complete resume of past experience to:

Mr. H. J. RECKAS
or Mr. E. T. MACULAK

Advanced Communications Engineering
A Division Of
Cook Electric Company
Chicago, Illinois
6038 Twenty Eighth Ave., S. E.
Washington 23, D. C.

FOR SALE

MAGNETO TELEPHONES — Leich 901 wall or desk magneto telephones. Cleaned, tested and guaranteed, $16.50 each. As removed from service $15.00 each. Turtle Lake Tel. Co., Turtle Lake, Wisc.

FOR SALE — Used telephones 235 W.E. 302's; 75 Stromberg 1250's and 190 Stromberg 1243's; 58 North 9800's and 30 North 9000's. These are priced to sell. Quantity lot prices $3.75 per set. Polar Telephone Company, Park River, N. Dak.

FOR SALE — Kellogg 1000 series telephones as removed from service. Make offer to City of Anchorage, Controller, Box 400, Anchorage, Alaska.

ASS'T SALES MGR.

For NORELCO's high quality precision telephone equipment. An experienced Assistant Sales Manager will administer this program.

Require person familiar with market, sales promotion, distribution, also a technical background in telephone systems desirable. Sales program to independent telephone companies, railroads and other utilities includes such equipment as voice repeaters, PABX, CDO's, etc.

Highly desirable opportunity for responsible, experienced person able to plan and grow in this unique position with an expanding company.

NEW YORK CITY
MANY COMPANY BENEFITS

Send resume including salary requirement to:

MR. MARTIN G. WOLFERT
100 East 42nd Street
New York 17, N. Y.

All replies held in strictest confidence

NORTH AMERICAN PHILIPS COMPANY, INC.

NORELCO

Immediate Openings

OVERSEAS AND IN THE UNITED STATES FOR —ENGINEERS—

Telephone Engineers, System Design
Telephone Inside Plant Engineers
Telephone Outside Plant Engineers
Telephone Traffic Engineers
Radio Relay Systems Engineers
Radio Relay Engineers
Radio Engineers
Teletype Engineers
Multiplex Engineers
Microwave Technicians
Power Engineers
Specification Engineers
Training Supervisors

U.S. CITIZENSHIP REQUIRED
(Families May Accompany)

Submit detailed resume of schooling and experience and definite basic salary requirements to:

BOX 144, c/o TE&M.

IT PAYS TO KNOW!

It is important for a Purchasing Agent, Manager or Owner to know the availability of equipment and supplies.

***Check the following list* and remember the next time you have a need — call or write for our low prices on Reconditioned Equipment.**

Coils, Induction
Coils, Relay
Coils, Repeating
Condensers
Dials, Telephone
Eliminators, Battery
Hand Sets
Heat Coils
Jack Strips
Jack Panels
Lamp Strips
Lamps
Mainframes
Operators Sets
Protection
Relays
Ringers
Ringing Converters
Switchboards
Telephones

BUCKEYE TELEPHONE & SUPPLY CO.
1250 KINNEAR RD. COLUMBUS 21, OHIO
HUDSON 8-0655

TELEPHONE ENGINEERS

DOMESTIC & OVERSEAS

High Salaries . . .
Permanent Position . . .
Liberal Employee Benefits . . .
Immediate Openings For:

OUTSIDE PLANT ENGINEERS

Knowledge of transmission loading and construction requirements for complete outside installation. Minimum 10 years progressive engineering experience.

INSIDE PLANT ENGINEERS

Step-by-step central office installation design and layout; carrier equipment and layout; traffic and transmission criteria. Minimum 8 years experience.

TELEPHONE TRAFFIC ENGINEERS

Experienced in traffic analysis. Degree plus 3 years experience or 10 years progressive plant experience.

U.S. Citizenship Required

Submit detailed resume & salary requirements to Employment Manager

CAPEHART CORP.

87-46 123d St, Richmond Hill 18, NY.

FOR SALE

1-four position Kellogg universal type switchboard of 700 line capacity equipped for 670 flat rate, 40 common battery and 40 magneto rural and 30 toll lines and 10 miscellaneous outgoing trunks, each position equipped with 15 cords.

1-one hundred line North Electric Co. all-relay community exchange, 10 years old, with code ringing fully equipped and including eleven automatic-to-manual trunk circuits arranged for CX or SX operation.

1-two hundred line North Electric Co. all-relay broadspan type community exchange, 20 years old, with code ringing, equipped for 150 lines and including nine automatic to manual CX type trunks, two automatic to automatic loop type trunks and three automatic to automatic SX type trunks.

1-Stromberg-Carlson relay dial central office unit, 14 years old, wired and equipped for 60 lines, 10 links, 4 automatic to manual CX trunks, 3 automatic to automatic SX trunks and arranged for harmonic ringing.

Write or call collect: J. J. Edgerley, General Telephone, 501 Tecumseh, Fort Wayne, Indiana. Phone: E-9611.

WANTED TO BUY

WANTED — All makes, old telephones. Our truck will pick up and pay you cash on the spot. Telephone Co., Turtle Lake, Wisconsin.

TELEPHONES — Any condition. Desk stands, wall sets, etc. Advise quantity available. Write Box 78, c/o TE&M.

IN STOCK

NEW TELE-WIRE LOW COMPETITIVE PRICES FOR RDW & "C" WIRE

RURAL DISTRIBUTION CABLE — REA APPROVED — For Prompt Shipment Out of Our Warehouse Nearest You!

3 Pair, 19 Gauge	$ 55.00/M Feet.
4 Pair, 19 Gauge	$ 69.00/M Feet.
6 Pair, 19 Gauge	$ 82.70/M Feet.
11 Pair, 19 Gauge	$142.00/M Feet.
12 Pair, 19 Gauge (.134 Core)	$145.00/M Feet.
16 Pair, 19 Gauge	$194.00/M Feet.
18 Pair, 19 Gauge (.134 Core)	$213.80/M Feet.

(OTHER SIZES AVAILABLE INCLUDING ALL SIZES IN 22 and 24 GAUGE)

RURAL "C" WIRE: (On 5,000 Ft. Factory Reels)

#14-2 Rural "C" Wire	$27.00/M Feet.
20,000 Ft. Or More —	$25.85/M Feet.
#12-2 Rural "C" Wire	$37.00/M Feet.
20,000 Ft. Or More —	$35.15/M Feet.

(All Preformed Tangent Supports & Dead Ends For Hanging This Rural "C" Wire Is Available From Stock Too!)

DIRECT BURIAL WIRE: #19-2, Armored With Sequential Markings on Jacket as per Latest REA PE-24 Specs.

On Full Factory Reels ..... $41.50/M Feet.

ALL SIZES & LENGTHS OF AERIAL (PE-22), DIRECT BURIAL (PE-23) CABLES IN ADDITION TO THE NEW FIGURE 8 RDW & FIGURE 8 ALPETH CABLES ARE AVAILABLE PROMPTLY.

TERMS: 1% 10 Days, Net 30; FOB DESTINATION!

QUANTITY DISCOUNTS

TELE-WIRE SUPPLY COMPANY, INC.
178-10 Liberty Ave. — AXtel 7-4756 — Jamaica 33, New York

FOR SALE

1600 LINE P. A. X.
Telephone System

Complete Automatic Electric Co. system consisting of 800 line switches and 800 line finders.

AVAILABLE JUNE 1961

Building Department
John Hancock Mutual Life Insurance Company
200 Berkeley St., Boston 17, Mass.
(DDD 617) HAncock 1-6000

FOR SALE
KELLOGG LOUD RINGING BELLS with 6-inch gongs
@ $9.00 delivered
REBUILT ELECTRIC EQUIPMENT CO.
1704 W. 21st Place
Chicago, Illinois

WANTED TO BUY

WANTED TO BUY
PAYSTATIONS—Please advise quantity, description, and price. Write Box No. 148 c/o Telephone Engineer & Management.

FOR RENT

FOR HIRE — Modern Coin Counting Machine open for position, counting Pay Phone collections. Will work 168-hour week. Salary, 19 cents per day. Write Watkins Company, Box 146, Napoleon, Ohio.

BELTS-CLIMBERS

BELTS — CLIMBERS — Complete Line men's equipment, W. M. Bashlin Co., Bashlin Bldg., Grove City 1, Pa.

CLAMPS

Finest in HAND CLAMPS & FIXTURE CLAMPS
Saxton Mfg. Co.
So. El Monte, Calif.

CORDS

CORDS, Switchboard (with or without plugs), Instrument (straight and retractile cords in eleven colors. — Commercial Cord Co., Inc., 26 Main St., Clifton Springs, New York.

CONSTRUCTION EQUIPMENT

BORING MACHINES, EARTH — Highway Trailer Co., Edgerton, Wisc.

DECALS

Made for trucks and equipment
Small or large quantities
Write for free catalog.
MATHEWS COMPANY
827 S. Harvey Oak Park, Ill.

DIAL REBUILDING

"DIALS"

Dial Haven Reconditioning Service provides expert workmanship plus genuine and improved parts to insure longer life for your telephone dials.

DIAL HAVEN INC.

P.O. Box 655 Monroe, N.Y.
Code 914 783-2221

DIRECTORY SERVICES

EVERY MONTH

More and More Telephone Companies use DIRECTORIES produced by

Your Inquiry Respectfully Solicited

LELAND MAST DIRECTORY COMPANY

1619 GREENWOOD WILMETTE, ILL.

FOR SALE

2000 Lines North MCXR 10,000 (10'6" cabinets).

Now working in Sanford, N. C.

Installed *new 1954* and after.

Available *May, 1961.*

Buy all or part (subject to prior sale).

Priced to sell.

Call collect: James A. Cobb, General Manager

HEINS TELEPHONE COMPANY

Sanford, N. C. Spring 3-7711

POLES

POLES, Southern Yellow Pine Pressure Creosote and Creo-Penta — Piedmont Wood Preserving Co., P. O. Box 700 Augusta, Georgia, Spartanburg, S. C.

POLES, Southern Yellow Pine — Taylor Colquitt Company, 217 Main St., Spartanburg, S. C.

POLES, Southern Yellow Pine — Texas Creosoting Co., Orange, Texas.

If you do not receive your personal copy of each issue of TELEPHONE ENGINEER & MANAGEMENT, why not enter your Personal Subscription sent to your home or office?

1 Year - 24 Big Issues - $4.00

Priced For Quick Sale

SUBMARINE CABLE

Lead (All New)
26 Pair #19 Ga. Paper Ins.
Lead Covered, Double Steel Wire Armor, two Layers Jute .....14,000 Ft.
(800 & 500 Ft. Lengths)
Ideal For Direct Burial under highway, etc.

OTHER CABLE

11 Pair # 19 Ga. Paper, Lead .... 22,000 Ft. (4,500 Ft. Reels)
7 Quad. #19 Ga., Paper, Lead ..100,000 Ft.
7 Quad. #19 Ga., Plastic, PVC .. 5,300 Ft.
37 Quad. #19 Ga., Paper, Lead .. 1,050 Ft.
51 Pair #19 Ga., Paper, Lead .... 1,200 Ft.
(plus 4 #16 Shielded Pair with polyeth, insulation) video, radio, carrier, etc.
303 Pair #22 Ga., Ankoseal 775P 1,600 Ft.
404 Pair #26 Ga., Paper, Lead .. 2,800 Ft.
152 Pair #26 Ga., Paper, Lead .. 2,000 Ft.
16, 26, 51 Pair #22 Ga., W.E. BUA, coded, textile Lead switchboard cable.

Quantity Discounts

5 Pair, #19 Neoprene (Latex Ins.) coded. New Army type—
1,000 Ft. Reels $50.00
10 Pair, as above, 100 Ft. Coils $10.00
Spiral 4, 1 Star Quad, #18 Stranded, Neoprene Jacketed ⅜" OD, Self-Supporting (also suitable for direct burial) 1320 Ft. Reels with Quick Connector. (6 MH Loading Coils Built Into Connector. $50. Reel).

Also New Plastic Type For Export Only

DROP WIRE, New #.104 Copperweld 40%, twisted Pair, Heavy Neoprene Jacket.
2000 to 4000 Ft. Reels .....$40. M. Ft.

#18 Ga., Copperweld, Neoprene, Reinforced Parallel, Lengths Average 500 Ft. (Used). Very good condition .....$10. M. Ft.

#14 Ga. Copper (Med. Hard drawn) New — Twisted Pair — PVC Plastic (1 black, 1 white) Factory coils 300' to 1000' (one length) per coil, No Splices ....$20. M. Ft.

DROP or Bridal WIRE — Neoprene Twisted Pair #20 ga. Copperweld 1000 Ft. Coils— New .....$15. M. Ft.

Field Wire W110B, Twisted Pair (3 copper — 4 steel strands per cond.) Rubber covered cotton braid — ½ Mile Steel Reels ..$7.50

Field Wire — WDITT — Nylon Plastic (4 copper — 3 steel strands per cond.)

Twisted Pair — Late type — used, (in Tactical Maneuvers) — May have Several Lengths per mile reel. Not spliced (wt. 70 lbs.) .....per mile $20

Telectric Co.

1218 VENICE BOULEVARD (DDD 213) Richmond 8-2249 LOS ANGELES 6, CALIF.

POLES • CROSSARMS
RAIL or TRUCK DELIVERY
Pressure-treated to your specifications. 16 sales offices, 34 plants serving you. See Yellow Pages, write or call Pittsburgh EXpress 1-3300.
C-10
KOPPERS COMPANY, INC.
Wood Preserving Division
777 Koppers Bldg., Pittsburgh 19, Pa.

NORTHERN WHITE
CEDAR POLES
FULL LENGTH PENTA TREATED
PAGE & HILL, INC.
Plymouth Bldg., Minneapolis 3, Minn.

SOLDERING IRONS

CARTRIDGE-HEATED SOLDERING IRON

Indispensible for all line work where no power is available. The perfect tool for the purpose, perfected and used for years by a major telephone company. Iron uses any one of 4 interchangeable tips, from ¼-inch to 1-inch, pyramid or chisel. Heat unit is expendable, thermit cartridge.

Send For Descriptive Circular
KEMODE MFG. CO., INC.
151 W. 18th St., N.Y. 11, N.Y.

DIAL REBUILDING

DAN MAC DIAL REBUILDING
DIALS REBUILT BY THE DAN MAC PROCESS GIVE THE SAME APPEARANCE AND SERVICE AND CARRY THE SAME GUARANTEE AS NEW.
TELEPHONE REPAIR & SUPPLY CO.
1760 Lunt Ave.
AO 4-3817 Chicago 26, Ill.

PROFESSIONAL SERVICES

ALLEN, K. HAMILTON ASSOCIATES, INC.
CONSULTANTS - SYSTEMS ENGINEERS
GENERAL ENGINEERS
WOODSTOCK, ILLINOIS TELEPHONE FEderal 8-2400

PROFESSIONAL ENGINEERING AND CONSTRUCTION SERVICES
Plant Construction Crews • Installer Repairmen Cable Splicers
CENTRAL OFFICE INSTALLATION
Complete central office routines, tests & adjustments, carrier installations, tests & alignments, key system installations
HENKELS & McCOY
PHILADELPHIA
1800 Johnson St. Elkhart, Ind. COngress 4-1121
Atlanta, Ga. TR 5-2769 St. Johns, Mich. CA 4-4175
Ashland, Ohio 3-7543 St. James, Minn. 492
Bloomington, Ill. 5-7717 Durham, N.C. 7-1316
Lebanon, Ky. 660 Wausau, Wis. 2.2356
Victorville, Calif. 5-9012
PERFORMANCE Has Built Our Business

TUDOR AND YAGER INC.
TELEPHONE CONSTRUCTION
TIPTON, INDIANA
Phone OSborne 5-2267

McGRATH ENGINEERING, INC.
Consulting Engineers
209 West 6th Street
TOPEKA, KANSAS
Telephone CEntral 2-2358

CARL C. CRANE, INC.
Consulting Engineers
121 S. Pickney Street, Madison 1, Wisc.
Telephone ALpine 6-0247

SLOAN, COOK & LOWE
CONSULTING ENGINEERS
SUITE 1344 120 South La Salle Street CHICAGO
Appraisals—Original Cost Studies
Investigations
Depreciation, Financial, and Other

Davis Construction Co.
UTILITY PLANT CONSTRUCTION
45 North Clark Street • Sullivan, Missouri

PROFESSIONAL SERVICES

Communication Systems, Electric Transmission and Distribution Systems
ASSOCIATED ENGINEERS, INC.
CONSULTING ENGINEERS
1127 Alderson Ave.
Billings, Montana
TEL. 2-4113

INSPECTION SERVICE
"AT TIMBER TREATING PLANTS"
Of poles, crossarms, and preservative treatments. Analysis of wood preservatives
Consultation and specification writing
A. W. WILLIAMS INSPECTION CO., INC.
MOBILE, ALABAMA
New York St. Louis Portland
Inspectors stationed throughout the U S A

C. D. EHINGER, P. E.
Consulting Engineer
Telephone Utilities
Mail Address:
639 W. Madison
Decatur, Indiana

Whether a Winch *Line Hook or a complete Line Body check* ✓ *your requirements with*

UTILITY TOOL & BODY CO.
CLINTONVILLE, WISCONSIN

USE
TE&M'S
Telephone
Market
Place

STROMBERG-CARLSON®

Transmitter

NEWS AND VIEWS OF INDEPENDENT TELEPHONY

VOLUME 10, NO. 1 | Published by the Telecommunication Division of General Dynamics | Electronics | APRIL, 1961

New developments lead to increased repeater usage

New applications and new products have made repeater operations increasingly important to the Independent operating company.

Developing these new applications and new Stromberg-Carlson products is part of the job performed by repeater engineers at the Telecommunication Division of General Dynamics | Electronics. They have blended experience with progressive techniques to maintain the company's leading position in the repeater field.

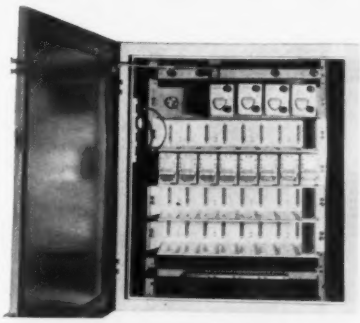
Pole box cuts cost, saves space

An Alabama Independent with wire lines wanted to reduce his interoffice loss from 15.8 db to 3.2 db over his carrier and two-wire extensions. Part of this required gain could be achieved within the existing carrier equipment. However, the major part of the gain would have to be realized through 541 Negative Impedance Repeaters.

The Stromberg-Carlson repeater engineers pointed out that, following traditional practice, repeaters could be placed at each end of the line; but that they had determined from a study of his line conditions that it would be possible to use half as many repeaters, positioned at the mid-point of the line, in a pole-mounted housing.

The substantial saving in space and expense afforded by the mid-point application appealed to the customer, and he tried it on several toll trunks. This application proved so successful that he decided to use the same principle on his loaded subscriber loops. In all cases, the repeaters placed at the mid-point of the line provided the necessary gain.

The pole-mounted housing, which will hold up to 16 series and 16 shunt 541 Negative Impedance Repeaters,



541 Repeaters in pole mounting

was designed to meet this type of problem. Other companies with similar line conditions may wish to have our engineers investigate the possible savings for them through mid-point repeater installations.

541 can work on phantom circuit

A Pennsylvania Independent wanted to know if negative impedance repeaters would work on his phantom circuits. This technique, possible only with a plant of high-quality construction, required extensive study by carrier/repeater engineers.

To insure that the modified 541 Negative Impedance Repeater would meet these requirements, Stromberg-Carlson transmission engineers duplicated line conditions of the customer in their laboratory. Working closely with personnel from the Independent company, these engineers were able to achieve the goal of VNL+2 needed to meet toll transmission requirements on the two side *and phantom* circuits. This is believed to be the first successful application of negative impedance repeaters on phantom circuits.

Hybrid repeater adds transistors

The Stromberg-Carlson hybrid repeater, which has become a standard in the transmission field, is available with a transistorized amplifier.

The repeater incorporating this advanced design is the 571 Hybrid Repeater, and it retains all the features of the well-known 551 Hybrid Repeater. The new amplifier operates directly from either 24-volt or 48-volt central office battery and therefore needs no external power supply. It has the capacity to handle more power than competitive models, and thus keeps distortion to a minimum.

Independents purchasing hybrid repeaters for the first time will find it economically advantageous to select the new 571 Hybrid Repeater. However, the 551 Repeater will be continued as a production model for companies that wish to add to existing 551 installations and have not reached the capacity of their external power supply.

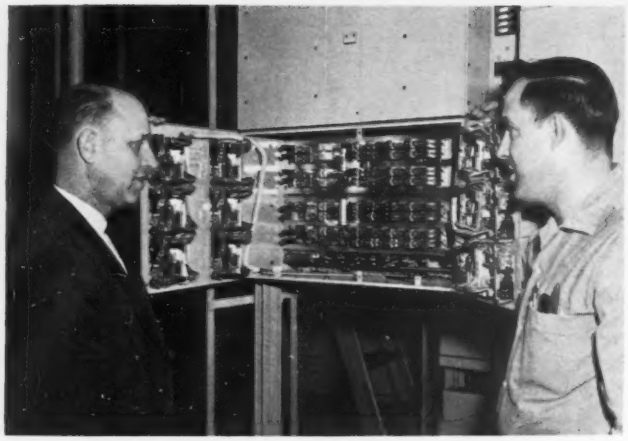
The transistorized amplifier is highly reliable and effectively keeps maintenance time negligible. It is interchangeable with the standard tube-type amplifiers in hybrid repeaters of other manufacturers.

Starting our 10th Year

As the TRANSMITTER enters its 10th year, your editor puts first value on friendships growing out of this association. These are the people who give stability and purpose to our industry; stories about their interests, hopes, success, make the TRANSMITTER unique in the trade publications. Our aim: to continue to merit your interest through articles that catch the warmth, as well as the momentum, of Independent telephony.

Advertisement

Photo above: Mrs. Kay Adair, Arkansas' First Lady. See story on page 119.



Floyd Vetter of Manassas, Virginia, just nodded and broke out in a huge grin when asked if XY Toll Ticketing was profitable. John Bull (right) is graduate of XY Toll Ticketing School.

After 30 months or 30 days: revenues mount with

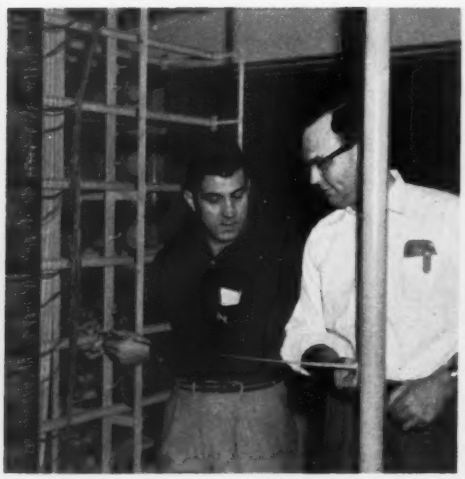
"Has return on your toll ticketing investment been satisfactory?"

The question was to Mr. Floyd Vetter, general manager of Central Mutual Telephone Company of Manassas, Virginia. His answer — a huge grin — made words superfluous.

Situated just a nice toll call distance from metropolitan Washington, this town is increasingly suburban. Telephone company management showed prophetic foresight in planning DDD as part of the conversion to dial a few years ago.

Now, 30 months later, initial enthusiasm stands completely justified. Subscribers compliment the telephone company for being the first Independent in Virginia to provide the advantages of DDD. Their acceptance is proved in usage; average daily calls have risen steadily since the installation of mechanized toll service. In 1960 the XY Toll Ticketing equipment processed 263,227 calls with an incredibly small percentage of error. The machines produced an informative record, for traffic study, of the calls that were incomplete — due to dialing errors, directory changes, or other reasons. Larger companies with

Family shares excitement with townsfolk at cutover of East Pembroke (N. Y.) to dial and DDD. Mr. Herman Wagner, president of Empire Telephone Company, with Mrs. Wagner, Beth Ann and Robert.



Station growth is good in Manassas itself and other towns served. Woodrow Vetter (seated), personnel manager, discusses expansion with G. C. Fravel, local manager for southern district; Wade Vetter (right), traffic manager, and Dave Harris measure space for terminal additions.

Zero hour at East Pembroke. Bill Carr cuts new lines into service, carefully "supervised" by Ham Cunningham, executive secretary of New York Association, and Cy Kurtz of Western Counties Telephone Co., Dundee.

enthusiasm still on rise as XY® Toll Ticketing

longer experience would gladly trade for this record and this knowledge.

Quite recently, another XY Toll Ticketing system was placed in service in the Rochester (N. Y.) area. Reduce everything to quarter size and you have a repetition of the Manassas success story.

East Pembroke is a small exchange in a small town — part of the Empire Telephone Company, but not adjacent to their other offices. Nearby is a city, non-Independent. When plans for converting the town to unattended dial were being discussed with Mr. Herman Wagner, president of Empire, provision had to be made for handling toll calls. Could the investment in toll ticketing equipment be proved in for such a small exchange?

The present Stromberg-Carlson Type 40 system was designed as "building block" equipment: full capacity and features for the large toll center; or streamlined efficiency to fit the feasibility requirements of the single small exchange. The decision to buy the system and keep the toll revenues seems wiser with each passing day.

Florida, and no operator!

Dawn Fisher sorts DDD tickets of the morning at Manassas. Averages about 900 per day.

Fred Gilg (foreground), REA field engineer; Joe Ferro, Stromberg-Carlson Telecom sales representative, examine some of the first tickets from XY Toll Ticketing equipment at East Pembroke.

DDD boosts toll-call frequency — proved in first days and over extended periods. Cy Kurtz and Harry Bangert of Western Counties see the early cards accumulating. At right, Herm Wagner and Al Galoscy relax as dial takes over East Pembroke.

XY Dial list adds 45 in December-January

The year 1960 produced notable advances in the services offered by Independent operating companies. As the year ended, companies of all sizes continued their drive to bring dial to every subscriber. Below is a partial listing of offices where XY Dial was installed between late November, 1960, and late January of this year. More than 40,000 subscribers are now enjoying the modern dial service furnished by these installations.

Arkansas
Hampton
Monette
Ola
Siloam Springs
Sparkman
Star City

Florida
Blountstown
Chattahoochee

Iowa
Lenox

California
Arbuckle

Illinois
Arcola
Ashland

Colorado
Briggsdale
New Raymer

Indiana
Flora
Griffin
Waldron
Walkerton

Kansas
Altamont
Rexford
Savonburg
St. John

Tennessee
College Grove
Nolensville

Missouri
Holden
Platte City
Tipton

North Carolina
Vass

Montana
Charlo

North Dakota
Starkweather

South Carolina
Branchville

Pennsylvania
Bedford
Williamsburg

Oklahoma
Bokchito
Colbert

Minnesota
Dodge Center
Northome
Solway
Squaw Lake

Texas
Bronson

Wisconsin
Chili
DeForest
Poynette
Warrens
Wild Rose

What do you show a visitor in your town?

If a visitor arrived in *Chesaning, Michigan*, during the "season," Victor Shapley would simply say, "Follow the crowd." They'd be heading for the Showboat, anchored in the river by the outdoor amphitheater. Thousands come from a score of states.

In *West Branch, Iowa*, Frank Pearson would direct the visitor to Herbert Hoover's birthplace. A new library will house the ex-President's interesting collection, gathered from all corners of the world during extensive travels.

Gerry Dickman, local manager at *Boscobel, Wisconsin*, would take you to the hotel where, in 1898, a group of dedicated men met to found the Gideon Society. Purpose is to place a Bible in every hotel room in the country.

Why not send an item and photo (black and white) about your town to: George Forbes, Editor Stromberg-Carlson Transmitter Telecommunication Division, 100 Carlson Road, Rochester 3, N. Y.

Now in its 20th season, Showboat at Chesaning, Michigan, draws 6,000 nightly. Nationally prominent stars are supported by highly trained local chorus.

Showboat proceeds support youth program, including town swimming pool, baseball, winter sports. All citizens rally behind project, contributing time, talent, expense money.

Two-room cottage in West Branch, Iowa, was humble home for Herbert Hoover. Ex-President and brother slept on one trundle bed.

Frank Pearson is manager of West Branch Telephone Company; was one of first to develop Mobile Radio Center connecting through telephone office for nationwide service.

"A Bible in every hotel room" is slogan and purpose of the Gideon Society, founded at Boscobel, Wisconsin.

Gerry Dickman is local manager of Boscobel Telephone Co., showplace and leader in XY Dial conversion of many exchanges in North-West Telephone Company system.

Mrs. Kay Adair, right, president of the Lincoln-Desha Telephone Company and head of the Arkansas Telephone Association, shares the satisfaction of dial conversion with Pete Ross, assistant manager, and his wife. The company operates four offices in Southeast Arkansas.

Arkansas telephony's First Lady brings dial to Star City

Mrs. Kay Adair, president of the Lincoln-Desha (Ark.) Telephone Company, makes it a point to keep busy. But the next six months may set some sort of record for activity.

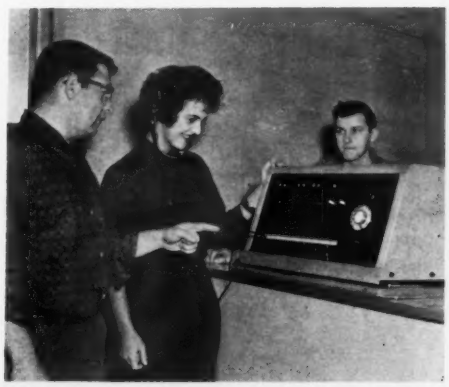
She's beginning the second half of her term as president of the Arkansas Telephone Association. And her company is planning expansion, following the recent conversion to XY Dial at Star City.

Mrs. Adair, the first woman ever selected to lead a state telephone organization, moved to Star City in 1942, when she and her husband purchased the telephone company there. Within ten years, they had added three more offices and incorporated their company.

At the death of her husband in 1958, Mrs. Adair became president and manager of the corporation. More than 2000 subscribers are served from the four offices.

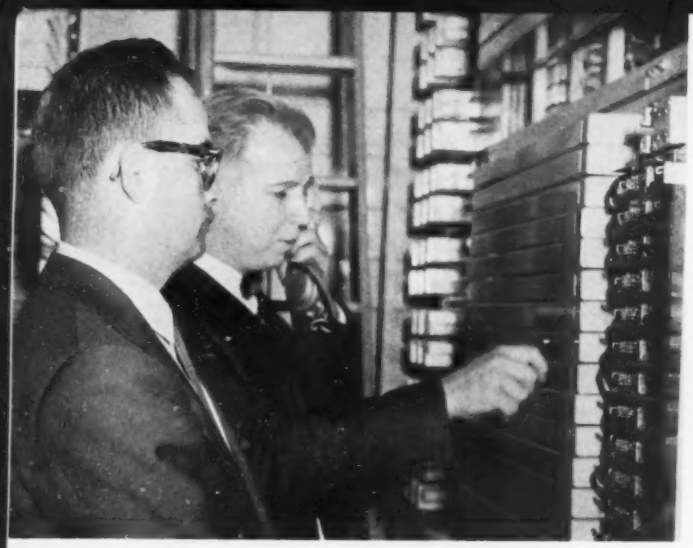
Mrs. Adair was generous in her praise of the work of the Stromberg-Carlson men who installed the Star City XY Dial system. "Knowing them," she said, "you learn to appreciate them as friends as well as installers — particularly for the many hours of night work that they did. We appreciate your company more for the type of employee it has."

Expansion at Star City will be no problem as the new office can effectively handle a 100% increase in subscribers. Pete Ross, assistant manager, supervised planning for the new building. Mrs. C. K. Fish is local office manager at Star City.



Miss Arkansas of 1960, Claudette Smith, learns about the features of special-service turret from Guy Pinkley, Stromberg-Carlson equipment installation foreman. Miss Smith, who represented her state in the Miss America competition, is a Star City resident. James Smith, installer, looks on.

Marvin Hill, Telecommunication Division sales representative for Stromberg-Carlson equipment, confers with operators at Star City switchboard.



Edwin Sharo, district manager for United Telephone Co. of Pa., watches as Ed Novak, the Stromberg-Carlson Telecom installation foreman, tests out lines at Mercersburg, Pa.

United Utilities boosts service in N. J. and Pa.

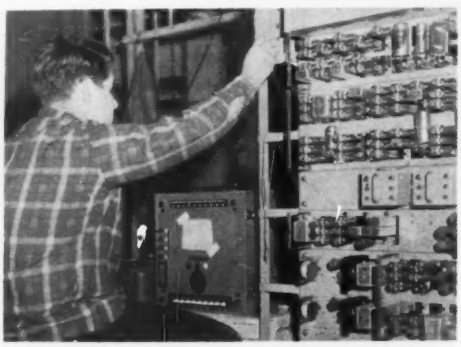
United Utilities, Inc., continues its planned program for providing the right combination of modern service throughout its nationwide system of operating companies. The people of Frenchtown, N. J., Mercersburg and Everett, Pa., are among the most recent to benefit from the ambitious program undertaken by the affiliated companies.

At Frenchtown (part of the New Jersey Telephone Company) the conversion to XY Dial was highlighted by a pre-cutover call by a six-year-old "sidewalk superintendent." Luralee Schrier, who faithfully visited the telephone building during installation of the dial equipment, placed the first call over the system on the evening before cutover.

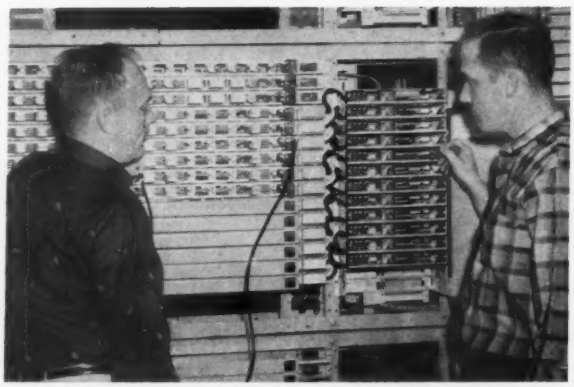
Subscribers at Mercersburg have found that the all-numeral dialing system there suits them fine. Stromberg-Carlson Toll Ticketing was cut into service along with the XY Dial, giving Mercersburg subscribers direct access to more than 43 million phones across the nation.

Everett, Pa., subscribers (Everett and Mercersburg are both part of the United Telephone Company of Pennsylvania) are also enjoying the combined benefits of XY Dial and Toll Ticketing. Customer-dialed calls from Everett will be routed through United's new XY Dial and DDD center at Bedford.

Dave Ross, installation foreman for Stromberg-Carlson Toll Ticketing, checks out the Everett identifier bay.



Luralee Schrier, a steady visitor at the telephone building, placed the first call over the Frenchtown, N. J., XY Dial system.



Installation foreman Julian Heavner, left, and John Blackburn, installer, routine linefinder groups and test XY Switch for release alarm at Frenchtown, N. J., office of the New Jersey Telephone Company.

Transmitter
GEORGE B. FORBES, Editor
J.T. LONG, Associate
XY Trademark registered

GENERAL DYNAMICS | ELECTRONICS
TELECOMMUNICATION DIVISION • 100 Carlson Road, Rochester 3, New York

ADVERTISERS' INDEX

AC Spark Plug Division of General Motors Corp. 85
ADC, Inc. .....
Acme Electric Corp. .....
Acme Visible Records, Inc. .....
Advanced Communications Engineering ..111
Airtronics International Corp. 71
Alphaduct Wire & Cable Corp. 94
Altec Lansing Corp. 92
Aluminum Co. of America 22-23
Aluminum Ladder Co. .....
American Chain & Cable Co. (Wright Hoist Div.) .....
American Tel. & Tel. Co. .....
Anaconda Wire & Cable Corp. 44-45
Arrow Fastener Co. 74
Associated Engineers, Inc. 114
Auburn Machine Works, Inc. 81
Automatic Electric Co. 12-13, 62-63

Banner-Nawman, Inc. 91
Berry & Co., L. M. ..... Inside Front Cover
Bishop Manufacturing Corp. 10
Brady & Co., W. H. .....
Brand-Rex Division of American Enka Corp. 17
Buckeye Tel. & Supply Co. 91, 111
Budelman Electronics Corp. .....
Burgess-Manning Co. .....

C & S Products Co. .....
Cable Spinning Equipment Co. .....
Calculagraph Co. 108
Capehart Corp. 112
Chance Co., A. B. 24
Charles Machine Works, Inc. 96
Chisholm-Moore Hoist Div. of Columbus McKinnon Corp. 91
Collins Radio Co. 25
Commercial Cord Co., Inc. 87, 112
Communication Equipment & Engineering Co. 96
Comptometer Corp. .....
Cook Electric Co. 21
Copperweld Steel Co. 101
Crane, Inc., Carl C. 114

Dahl Co., Inc., George W. 106
Davis Construction Co. 114
Davis Manufacturing, Inc. 104
Dial Haven, Inc. 113
Diamond Expansion Bolt Co., Inc. 98
Donnelley & Sons Co., R. R. 74

Ehinger, C. D. 114
Electronic Secretary Industries, Inc. .....
Exide, Industrial Div. of The Electric Storage Battery Co. 77

Fair Radio Sales .....
Fitchburg Engineering Corp. 60
Floor-Con 83

Gagne Enterprises, Inc. .....
General Cable Corp. 6-7
General Dynamics | Electronics ..54-55, 115-120
General Machine Products Co., Inc. 79, 102
General Telephone Directory Co. ..Back Cover
Gladwin Plastics, Inc. .....
Gould-Batteries, Inc. 89
Graybar Electric Co. 18-19
Greenlee Tool Co. 16

Hallamore Electronics Co. .....
Hamilton Associates, Allen K. 114
Harris-McBurney Co. .....
Heins Telephone Co. 113
Heller Roberts Manufacturing Corp. .....
Henkels & McCoy, Inc. 114
Highway Trailer Co. 112
Holan Corp. 99

ITT Kellogg 4-5
Independent Telephone Repair Co. .....
Indiana Steel & Wire Co., Inc. 109
International Teletronics, Inc. ..... Inside Back Cover

John Hancock Mutual Life Insurance Co. 112
Johns-Manville 100

Kearney Corp. .....
Kelley Products Div. of Crutcher-Rolfs-Cummings, Inc. 69
Kemode Manufacturing Co., Inc. 114
Keystone Steel & Wire Co., Inc. .....
Kohler Co. .....
Koiled Kords, Inc. .....
Koppers Co., Inc. 114

Leich Sales Corp. 48-49
Lindsay Telephone Supply Co. 43
Lorain Products Corp. 28
Lynch Communication Systems, Inc. 15

Mast Directory Co., Leland 113
Mathews Company 112
McCabe-Powers Body Co. .....
McGrath Engineering Co. 114

Monsanto Chemicals Co. (Plastics Division) .....
Morrison-Pelsue Co. 76
Motorola, Inc. 93

Natco Corp. 65
National Standard Co. 103
National Telephone Supply Co. .....
Neuses, Inc., P. K. 65
North American Phillips Co., Inc. 111
North Electric Co. 107
Northeast Electronics Corp. .....

Okonite Co. .....

Page & Hill, Inc. 114
Panhandle Electric Sales, Inc. 95
Phelps-Dodge Copper Products Corp. 37
Phillips Chemical Co. .....
Piedmont Wood Preserving Co. 113
Platt Electronics Corp. .....
Power Unit Sales Co. .....
Preformed Line Products Co., Inc. .....9—A, B
Puregas Equipment Corp. .....

Railway Communications, Inc. .....
Raytheon Company .....
Rebuilt Electric Equipment Co. 112
Reliable Electric Co. 2-3
Rohn Manufacturing Co. 20
Rolatape, Inc. .....

S & G Manufacturing Corp. 53
Saxton Manufacturing Co. 112
Schauer Manufacturing Corp. 56
Seymour Smith & Son, Inc. 26
Sheppard Co., Inc., R. H. .....
Sherron Metallic Corp. 27
Sierra Electronics Corp. 97
Sloan, Cook & Lowe, Inc. 114
Stampings, Inc. 102
States Co., The 84
Stewart Bros. Div. of Instrument Lab's .....
Stonhard Co. .....
Superior Cable Corp. 105
Suttle Equipment Corp. 88

Taylor-Colquitt Co. 113
Tele-Wire Supply Co., Inc. 112
Telectric Co. 113
Telephone Engineer & Mgmt. .....
Telephone Repair & Supply Co. 114
Teletype Corp. .....
Texas Creosoting Co. 113
Thornhill Publishing Co. 60
Trepac Corp. of America .....
Truck Equipment Co. 90
Tudor & Yager, Inc. 114

United Electric Controls 52
United Manufacturers Co. .....
United States Independent Telephone Association .....
United States Instrument Corp. 59
United States Steel Corp. .....
Universal Controls Corp. .....
Utility Tool & Body Co. 114

Vermeer Manufacturing Co. 106
Victory Engineering Corp. 86

Warren Manufacturing Co., Inc., ..Third Cover
Watkins Co., W. E. 112
Western Electric Co. 38-39
Whitaker Reel Manufacturing Co. .....
Whitney-Blake Co. 8
Wilkinson Products Co. .....
Williams Inspection Co., Inc., A. W. 114
Winders & Geist, Inc. 110
Wyoming Valley Equipment Div. .....

Third Annual Telephone Merchandising Workshop sponsored by the Wisconsin State Telephone Association at the University of Wisconsin Management Institute was designed for telephone companies interested in additional revenues, and for telephone people seeking ways to make work hours more productive. Members attending the workshop are shown above:

First row reading (l. to r.): ANDREW OMTVEDT, Chibardun Tel. Cooperative, Dallas; H. J. BRADISON, General Tel. Co. of Wis., Wausau; R. F. STENSRUD, General Tel. Co. of Wis., Wausau; WALTER C. SHEPARD, La Crosse Tel. Corp., La Crosse; MRS. ROBERT E. RIORDAN, Pulaski Merchant's & Farmer's Tel. Co., Pulaski; HAROLD KEENEY, La Crosse Tel. Corp., La Crosse; L. N. GODFRIAUX, Middle States Tel. Co. of Ill., Savanna, Ill. Second row (l. to r.): RAY J. RIORDAN, Wisconsin State Tel. Association, Madison; BEN SMITH, Southwestern Bell Tel. Co., St. Louis Mo.; JOHN WELSH, Peoples Tel. Co., Mt. Hope; R. T. EVANS, Amery Tel. Co., Amery; HAROLD PEARSON, Amery Tel. Co., Amery; HAROLD BOLLINGER, Pioneer Tel. Co., Waconia, Minn.; ROBERT E. RIORDAN, Pulaski Merchant's & Farmer's Tel. Co., Pulaski. Third row (l. to r.): V. A. RALPH, Middle States Tel. Co., of Ill., Des Plaines, Ill.; WILLIAM M. JERMAIN, Wisconsin Tel. Co., Janesville; JAMES H. WENZLAFF, Wood County Tel. Co., Wisconsin Rapids; R. F. SCHUMM, Middle States Tel. Co. of Ill., Park Ridge; LAWRENCE EIDE, Viroqua Tel. Co., Viroqua; D. ANDERSON, General Tel. Co. of Wisc., Black River Falls; WAYNE GETTER, Viroqua Tel. Co., Viroqua; WILLIAM P. STILWELL, Management Institute, University of Wisconsin, Madison; K. H. HOFFMAN, General Tel. Co. of Wisc., Edgerton.

THE BACK OF THE BOOK

By JOHN G. REYNOLDS

West Coast Tel. Names Two To New Positions

APPOINTMENTS to a major staff position in West Coast Telephone Company's general offices, Everett, Wash., and a top executive post in the firm's Washington District have been announced by L. Gray Beck, vice president and general manager of the three-state utility.

JOHN WHITTAKER

John Whittaker, a resident of Edmonds, Wash., and a West Coast employe for the past 12 years, has been named general commercial superintendent, an office he assumed on April 1. In his new position, Whittaker has general staff responsibility for all phases of commercial operations for the company's 73-exchange telephone system. He succeeds James L. Morrison who left the firm following nearly five years of service in two general staff positions.

R. C. (Bob) Anderson of Everett, personnel supervisor, has been chosen to take over Whittaker's present duties as Washington district commercial superintendent. In his new capacity, Anderson will have charge of the company's commercial operations in the state of Washington.

Whittaker began his telephone career with West Coast in 1948 as an apprentice switchboardman. In 1951 he entered the ranks of the firm's management as Halls Lake division wire chief, and in 1958 was named equipment installation supervisor. He was appointed Washington district commercial superintendent in 1959.

Anderson joined West Coast in 1955 as assistant commercial engineer. He was in the department in 1957 as employment

R. C. ANDERSON

INTERNATIONAL TELETRONICS INC.

Serving the Communications Industries of the World

Relieve The Squeeze With Urban X Subscriber Carrier by Panhandle

- Subscriber end Rack or Pole Mounted
- Only 57¾" Rack Space for 20 Channels
- Area Service up to 28 Miles from C. O.
- Divided bridged or super imposed ringing
- Signal Units Meet Industry Requirements
- Modular "Plug In" Units
- Provides Standby Power
- Only 2 cable pair required For 20 channels
- Simplified and Economical Test Equipment
- Self powered Test and Line-up Equipment
- No External Filter Equipment Required
- Loop Limit 1200 ohms From Subscriber Terminal

Write or Phone For Complete Details

INTERNATIONAL TELETRONICS

644 Braniff Airways Bldg.
Dallas 35, Texas

300 Exchange Pk., N.
Phone FL 7-8353

Let our "Revenue Men"

TAKE THE KINKS OUT OF YOUR KNOTTY DIRECTORY PROBLEMS!

Take a man like
Dave Beam

Dave is one of our "Revenue Men" in Portsmouth, Ohio.

Ten years before he joined General Telephone Directory Company, Dave earned a big name for himself in the area for his prowess on the football field, basketball court and on the track cinders. Competitive sports still rate high with Dave.

Dave served with the U. S. Air Force in Japan, then returned to Lexington, Kentucky, for college training. He then went to work in retail sales management, later as an insurance salesman.

In 1954, he joined General Telephone Directory Company as a sales representative in Lexington. Last year, he was named Sales Supervisor of our Portsmouth, Ohio, Unit in the Lexington Division.

It didn't take long for Dave, his wife Karra, Dave, Jr., and daughter Doris Lynn to become well established in Portsmouth. He is very active in church affairs, and is currently serving as Deacon of his church. The Community Chest, CARE, and Red Cross also claim much of his time and talent.

Dave Beam is typical of the "Revenue Men" who work for General Telephone Directory Company—and for you. They're an asset to any community.

Our Directory "Revenue Men" provide the Independent Telephone Industry with a flexible and highly skilled telephone directory organization. These men—working out of 35 strategic locations—are experienced specialists, trained to give you *complete* and *quality directory service.*

They act as telephone company representatives in their day-to-day contacts with your customers, not only selling and supervising the sale of Yellow Pages advertising—but also acting as public relations representatives for you in their dealings with the public.

Thoroughly trained to know any condition that pertains to telephone service, they're experienced hands at helping large and small Independent Telephone Companies "take the kinks out of knotty directory problems!"

Write or phone our office nearest you for our Complete Directory Service Plan.

GENERAL TELEPHONE DIRECTORY COMPANY

1800 Oakton Boulevard
Des Plaines, Illinois
VAnderbilt 7-6111

DIVISION OFFICES:
Bloomington, Illinois • Columbia, Mo. • Durham, N. C. • Erie, Pa. Fort Wayne, Ind. • Honolulu, H. I. • Lexington, Ky. • Long Beach, Calif. Madison, Wis. • Manila, P. I. • Muskegon, Mich. • St. Paul, Minn. San Angelo, Tex. • San Francisco, Calif. • Spokane, Wash. St. Petersburg, Fla.